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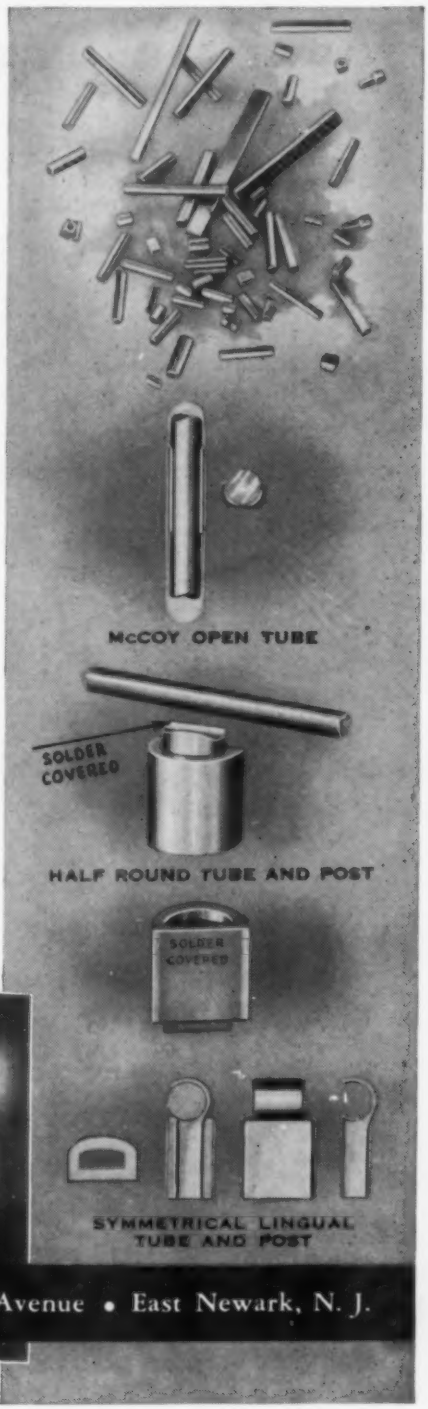

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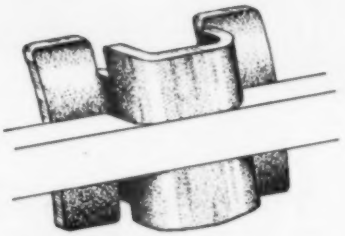

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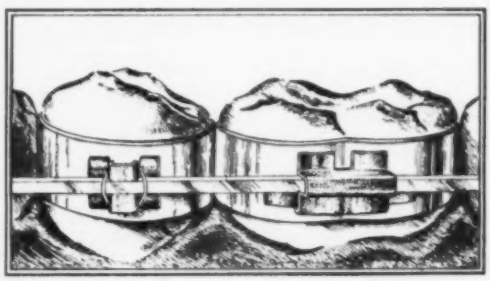

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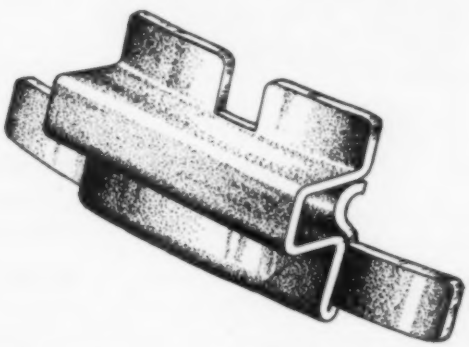

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American Journal
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VOL. 35 JULY, 1949 NO. 7

Original Articles

THE IMPORTANCE OF SIMPLICITY IN ORTHODONTIC MECHANISM AND SOME ESSENTIAL REQUIREMENTS OF SUCH APPLIANCES

JAMES DAVID MCCOY, D.D.S., BEVERLY HILLS, CALIF.

AS LONG as *orthopedics* is practiced, whether it be in the broader field or as *dentofacial orthopedics,* appliances of some sort will be essential. Regardless of the task, the restoration of normal form and function is the objective of such procedures and even where surgery is employed, appliances have an important role of usefulness. In *dentofacial orthopedics,* which we call *orthodontics,* the function of mechanical control and traction or both, are essential during certain phases of treatment, and serve as a means of directive support in post-treatment care where adaptive growth is supplementing the benefits initiated by the orthodontist.

In considering the design and character of such implementing agencies, the orthodontist is usually guided by *his concept of the orthodontic problem.* This must of necessity take many things into consideration which will include the manner of growth and action of the structures of the dentofacial area, under both normal and abnormal conditions. We know from the Bolton Study, and from other sources, that normal dentofacial developmental growth from infancy to adulthood is an orderly continuous process but is less marked as maturity is approached. During this period, the face grows downward, forward, and outward, carrying the dentition with it. The nasion moves forward and slightly upward, the size of the orbit increases, its lower margin moving forward and slightly downward. The porion or ear hole moves markedly downward and backward as does also the mandibular condyle, while the premaxilla grows forward in harmony with directions of growth in the adjacent dentofacial area. There is a marked increase in the vertical length of the face, especially evident along the lower border of the body of the mandible, with the chin moving well out from under the brain case. Fig. 1, prepared for me by the Bolton Study, graphically supports this statement.[1]

Read before the twenty-first General Meeting of the Pacific Coast Society of Orthodontists February 21, 1949, at San Francisco, Calif.

Todd[2] tells us, "Growth within the face and jaws, while more or less continuous, undergoes periods of acceleration, sometimes referred to as 'growth spurts.' From the seventh to the twenty-fourth month some vertical growth occurs. During the third and fourth years, vertical and some horizontal growth takes place. Between the fourth and seventh years, horizontal growth is very evident. This is followed by both horizontal and vertical growth up to about the eleventh year. Growth changes in both directions are again registered between the fifteenth and nineteenth year."

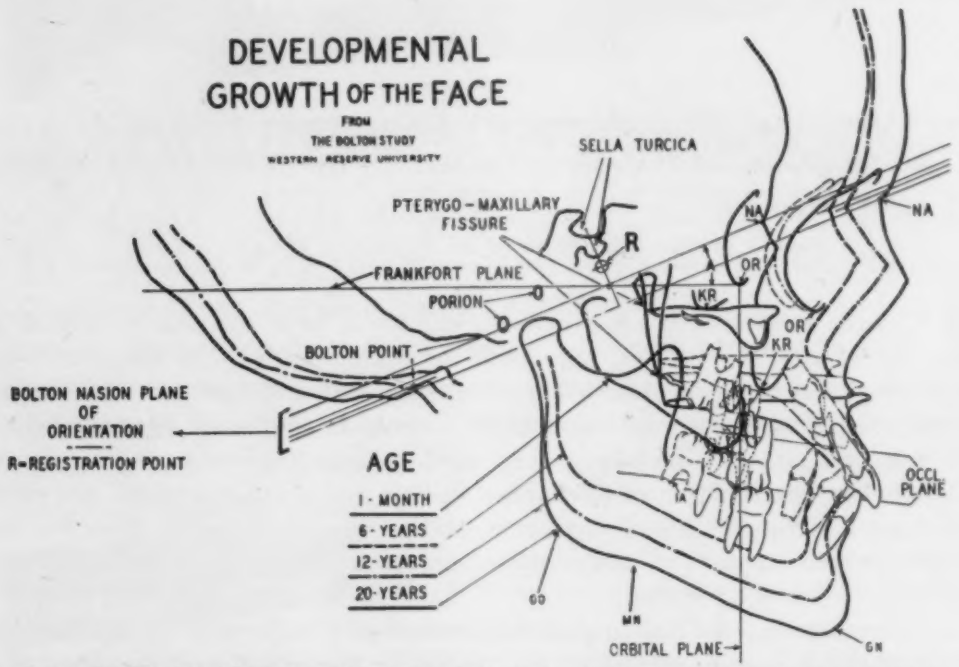

Chart of dental-facial developmental growth from Bolton Study records of the same child at one month, six years and twelve years superposed in Bolton relation on another individual of twenty years. The tracings are registered on the point R, the midpoint on the perpendicular from the Bolton Nasion Plane, and oriented with the Bolton Planes parallel. GN, Gnathion; GO, Gonion; IA, Internal Angle of the Mandible; KR, Key Ridge; MN, Antegonion; NA, Nasion; OR, Orbitale.

Fig. 1.—Normal dentofacial developmental growth from infancy to adulthood. (Courtesy of the Bolton Study and Lea & Febiger.[1])

Such known records of growth changes under normal conditions should impress several facts: first, that our field of operation and all the structures concerned *are in a state of change during orthodontic treatment;* second, *that periods of advantage may be selected for active treatment, to the end that when normal functional and anatomical balance is established, subsequent growth changes may be advantageously utilized in augmenting and rendering permanent the benefits of treatment.* The period approximating the ninth year is deemed logical, providing *developmental levels and dental age are favorable.* The foregoing facts of dentofacial developmental growth also impress the thoughtful clinician with the importance of the health factor, before, during, and subsequent to orthodontic treatment, for disease may profoundly effect the structures coming under the influence of our treatment measures.

Also included in any rational orthodontic concept must be a full realization of the nature and extent of dentofacial anomalies. This cannot be limited to maloccluding teeth nor can we think of the denture as being an isolated object, but rather as a part of the dentofacial area and as an organ having many dependent relationships. Keeping in mind the manner in which these structures grow under normal conditions we realize more completely the nature of their deviations from such a pattern, when the effects of disease or other environmental influences bring about *malgrowth with resulting dysplasias.* The futility of trying to classify these into three categories and establish any degree of finality, will soon become evident to those who are willing to analyze and compile the numerous variations of abnormal character which may be the resultant of a chain of events started early in the life of the individual.

Our concept must also contain the admission that numerous cases are untreatable. Among such we will include those which are markedly *macroglossic,* those accompanying certain *endocrine dysfunctions* and having definite *macrognathic changes,* especially of the mandibular structures, *cases of definite cerebral palsy commonly known as "spastics"* and *finally those suffering with certain congenital and hereditary defects both mental and physical in character.*

Another phase of our orthodontic concept, which will have its bearing upon appliance design and application, is the realization that *"in cases where the disproportion between the teeth and other facial structures is unmistakably apparent, the orthodontist is justified in the removal of such teeth as are essential to establish a better balance."*[3] Such dental units to be eliminated may be *third molars, second molars, bicuspids, or other teeth, depending upon the individual problem.* The question of extraction in orthodontic treatment was thoroughly and scientifically discussed by Dr. Calvin S. Case more than 40 years ago and he was roundly condemned by what was then known as the "new school of orthodontists." This group adhered to the uncompromising attitude of their leader Dr. Edward H. Angle, whose stand upon this subject is so well known that it need not be discussed at this time.

It is the opinion of this writer that where dental units are to be eliminated, *our attitude should be a conservative one and sound clinical judgment employed in coming to a decision as to their number and location.** My plan, which has long been practiced, has been to call in the father or mother or both (and other direct relatives if they are available) so that a practical idea of the patient's genetic pattern may be obtained. *The elimination of dental units also may be essential to balance our dental forces where certain teeth are congenitally absent or have had to be removed because of extensive dental caries.* In other words it will always be found advantageous to follow the rule laid down years ago by Dr. Andrew F. Jackson who defined the objectives of orthodontic treatment as, "The attainment of structural balance, functional efficiency and esthetic harmony."[4]

*A careful survey of the author's practice during the past two and one-half years reveals the following: In four cases it was found necessary to remove the four first bicuspids. In one case where the mandibular second bicuspids were congenitally absent, the maxillary second bicuspids were eliminated. In three cases under post-treatment care all third molars were removed. In any busy practice it is conceivable that the need for this type of therapy might vary from year to year depending upon the type of cases applying for treatment.

No appliance is a panacea for the relief of orthodontic problems, regardless of the bountiful propaganda which may be put forth in its behalf. At best it is a mechanism for the application of pressure or traction to teeth individually, in groups, to dental arches singly, or in their opposed state, with the object in view of bringing about the changes in those structures necessary to establish normal anatomical and functional balance. Since at best their instrumentality must be directed toward re-establishing *certain normal natural forces which for the time being have been disrupted,* their operation should be made as direct and as simple as is consistent with efficiency. The forces alluded to have often been referred to as "the forces governing occlusion" and listed briefly are: (1) the inclined planes of the occluding teeth; (2) harmony in the size of the dental arches; (3) harmony in the relation of the opposing dental arches; (4) normal approximal contact; (5) the normal action of the muscles directly related to mastication and expression. If we can through the skillful use of appliances make possible all of these factors, the chances for normal growth and development immediately become favorable. At this point it should be recalled that "growth is usually defined as increase in size, while development is progress toward maturity."[5]

Since the following fundamental pathological conditions may conjoin in dental and oral anomalies, our efforts are naturally directed toward their relief. These are: (1) malposition of individual teeth; (2) maldevelopments of arch-form; (3) malrelation of the dental arches accompanied with maldevelopment of portions of the maxilla or mandible, or both; (4) miscellaneous deformities, including the effects of such congenital conditions as maxilary cleft, deformities due to prenatal influences, to fractures, burns, blows, etc.; those resulting from disease, e.g., fibroma ankylosis etc.; abnormalities of dentition, known as anomalies of form, of number, and of eruption; groups of deficient or malfunctioning muscles, and abnormal developments of the tongue. Naturally the skillful clinician recognizes in this broad group *the cases untreatable by orthodontic means and attempts to get them into the hands of those in the field of medicine or surgery who can afford them some relief.*

It is felt that our strategy in the use of appliances must consider each dental arch as being composed of *four segments;* one frontal composed of *the incisors,* two lateral made up by *the cuspids and premolars,* and two posterior *which will include the molars.* These are illustrated in Fig. 2. By controlling these segments at the proper time, *and here we have dental age to deal with rather than chronological age,* we can cause a human denture and its supporting structures to assume normal relationships and continue their progress toward maturity. This statement is predicated upon the assumption *that the case is treatable and the patient cooperative.* This may all be done in the majority of cases *with six bands and a labial arch wire upon the upper teeth and a lesser number upon the lower teeth, with the removable lingual arch wire used in the majority of instances. A variety of attachments are available, the important essential being that the union between a round arch wire and*

the banded teeth be non-rigid but controlled in character. In this manner the elimination of pain from the patient's experience can be assured. In no case should it be necessary to employ both a labial and a lingual arch wire upon the same jaw. With the addition of such auxiliaries as rubber bands, various types of springs, stainless steel ligatures, and suitable post-treatment appliances such as the Hawley retainer, the removable lingual arch wire, and the cuspid to

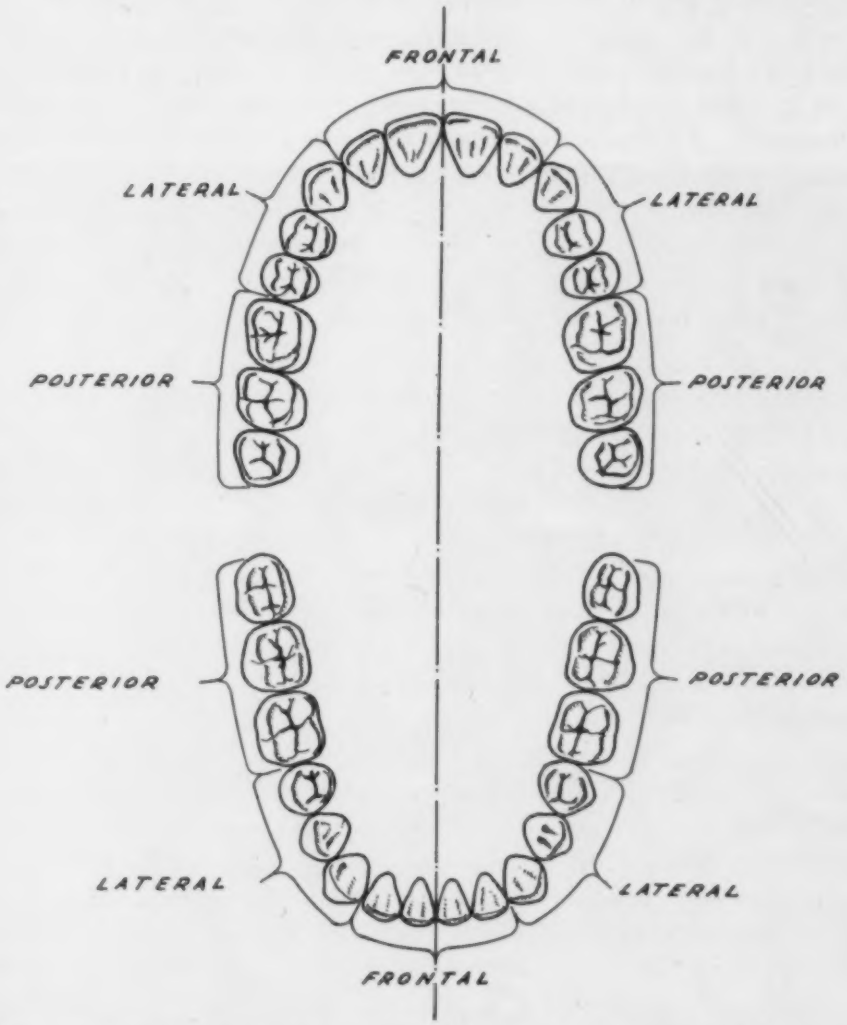

Fig. 2.—Our strategy in the use of appliances must consider each dental arch as being composed of four segments: One frontal composed of the incisors, two lateral made up by the cuspids and premolars, and two posterior which will include the molars.

cuspid retainer, *the armamentarium of the orthodontist may be considered adequate for the skillful clinician.* In considering this list and their application, it will be apparent that in their use *we have stability of attachment, and therefore force control, strength with delicacy retained, the best opportunity for cleanliness and inconspicuousness, and real efficiency.* I have purposely avoided

mentioning some recently advocated and publicized implements, either because of their archaic character or unwarranted use by those who handle their cases logically.

Through the use of the appliances referred to, we have the means available for establishing *those most important of all teeth, the first permanent molars in their normal positions.* They frequently need rotation and also changes in their anteroposterior and buccolingual relationships. *The dual control between the frontal and the posterior segments allows for spacing suitable distances into which the bicuspids and cuspids may erupt.* Under the guidance of the tongue or by other means, *the establishment of normal dental arch width may also be achieved. Control of the frontal segments provides for tooth alignment and normal incisogingival relationships.* These latter are frequently referred to as the "overbite" and by controlling this, *erupting teeth in the lateral segments assume their normal relationships in the occlusal plane.* The advantage of having one arch wire operating in each dental arch becomes apparent when the matter of the rotation of molars and their other occlusal relationships is considered.

Under skillful guidance, and in keeping with the plan just described, *the forces of occlusion are automatically achieved, and one of the most important, normal approximal contact is not disturbed by an unnecessary number of banded teeth.* In carrying forward this plan of treatment *no bite-planes are necessary during active treatment, for the balancing control between the frontal and posterior segments provides erupting teeth the opportunity to assume normal vertical as well as horizontal relationships.* Where cross-bites are present the anchorage problem is solved by establishing stationary anchorage upon the normal side and if necessary including additional teeth to amplify the resistance necessary.

From the foregoing it will be evident that a strong belief is held that cases should be treated during the mixed dentition stage of development. *My own conviction is that taken at a suitable dental age so that the cuspids and bicuspids are erupting during the period of active treatment, the orthodontist has the greatest opportunity of conferring maximum benefits.* This is especially true in dysgnathic anomalies, which after all make up the majority of our patients. Furthermore *the treatment period is brief and the results positive.*

In lending emphasis to the opinions which have been expressed, three cases will be presented. First, *a eugnathic anomaly** with a marked disturbance in the denture, necessitating the repositioning of all teeth but with the patient having a normal mandible; the second, *a dysgnathic anomaly* with a marked *dentofacial dysplasia* which will be shown in the process of treatment, to illustrate the typical manner in which such cases may be handled; and third, a *patient where the diagnosis definitely indicated the removal of teeth as part of treatment.*

*The terms used are among those approved by the nomenclature committees of the American Association of Orthodontists and the American Board of Orthodontics.

CASE REPORTS

CASE 1.—A girl 10 years and 5 months of age was placed under treatment Aug. 11, 1942. The series of records depicting her case are shown in Fig. 3. The appliances utilized are shown in Fig. 4, and in Fig. 5 an analysis of the dentofacial growth changes occurring with treatment are demonstrated. A labial arch wire was employed upon the upper teeth, which in addition to anchor bands upon the first permanent molars carried attachment bands upon the four incisors. Upon the lower teeth a removable lingual arch wire was used, with the first permanent molars being the anchor teeth, and with a stabilizing band upon one of the cuspid teeth. As soon as the frontal segments were brought to approximate alignment, intermaxillary traction was applied.

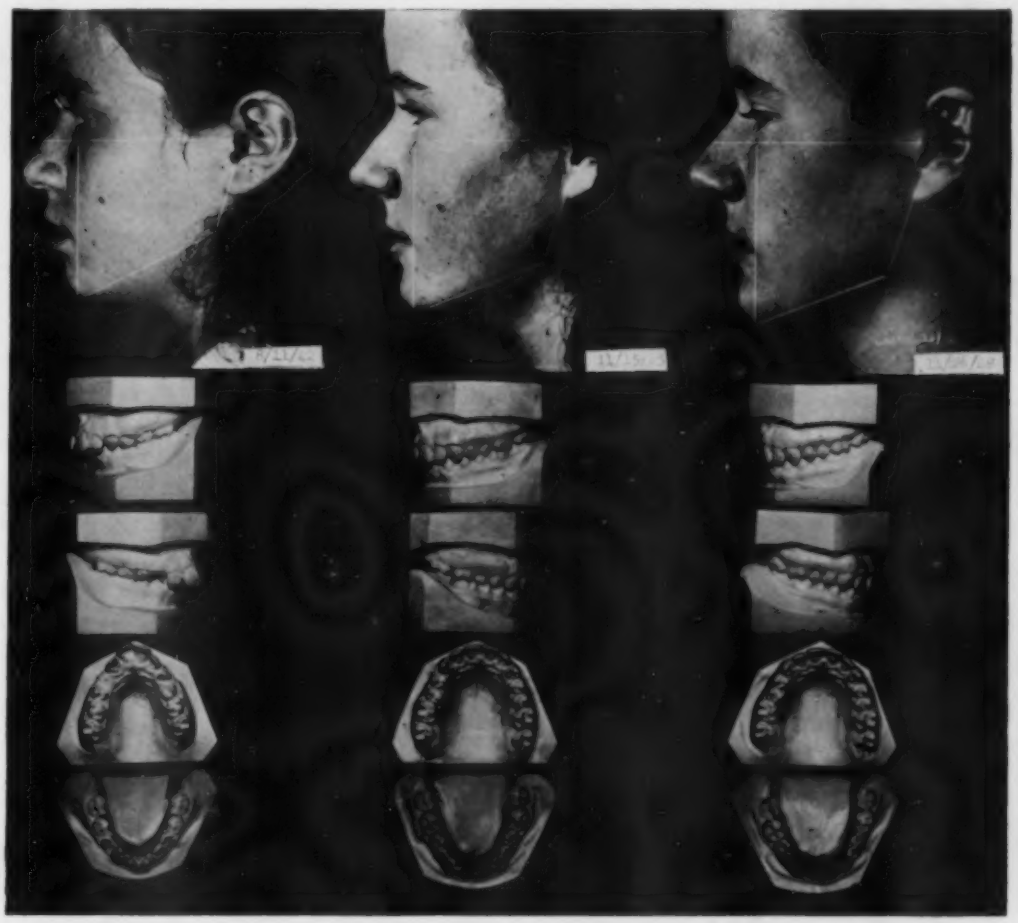

Fig. 3.—Case 1. A series of records depicting a girl 10 years and 5 months of age at the time treatment was started.

Both maxillary molars were slightly rotated so that the lower molars could assume relationships of mechanical advantage with their opposing molars. The maxillary incisors were slightly retracted and moved upward through the reciprocal action of the arch wire which likewise elevated the molars, while

similar changes were brought about in the lower dental arch. In less than one year all the teeth were in normal anatomical and functional balance, the deciduous teeth present at the beginning of treatment having been shed in the

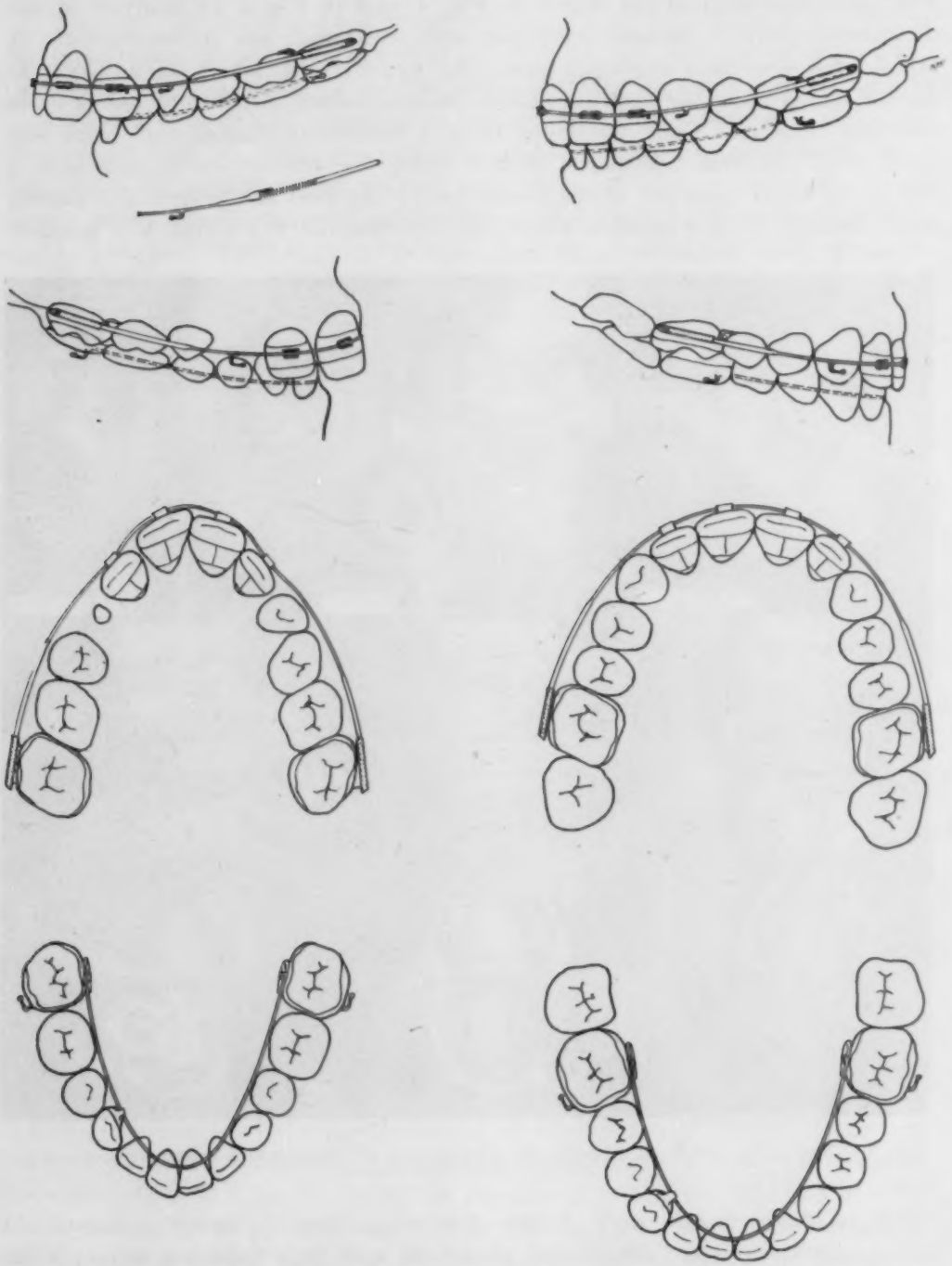

Fig. 4.—The appliances utilized in the treatment of the case shown in Fig. 3. Any of the standard attachments could have been employed as the source of control between the arch wires and banded teeth.

meantime and replaced by their permanent successors. At this point the patient moved to a distant community and visits every 60 or 90 days, only, were possible. Because of this, the active treatment appliances were left in place until an opportunity was offered to remove them and place those suitable for post-treatment care. These consisted of an upper Hawley retainer which was worn at night only and in addition to the usual features, carried a shelf or bite-plane to protect the incisogingival relationships obtained during active treatment. Upon the lower teeth the removable lingual arch wire was left in place.

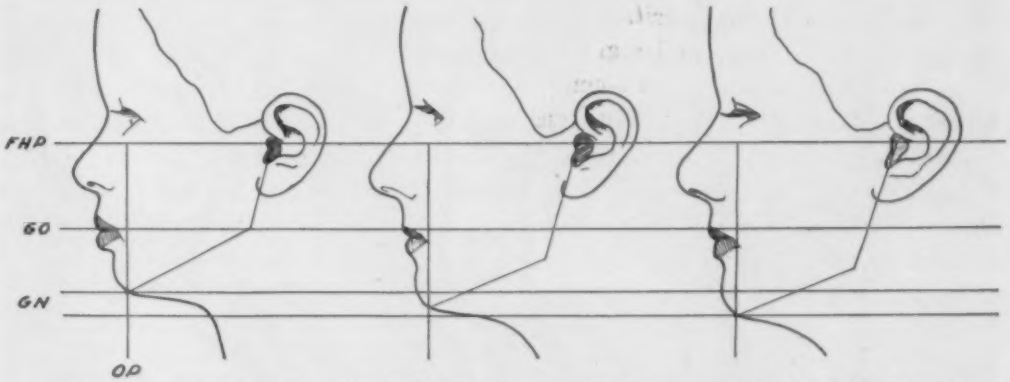

Fig. 5.—An interesting method of analyzing dentofacial changes by carefully tracing a series of photostatic facial records. This patient, also shown in Fig. 3, prior to becoming my patient was told that she had a double protrusion and that all 4 first bicuspids must be eliminated. The incorrectness of this diagnosis is easily apparent by the results of treatment.

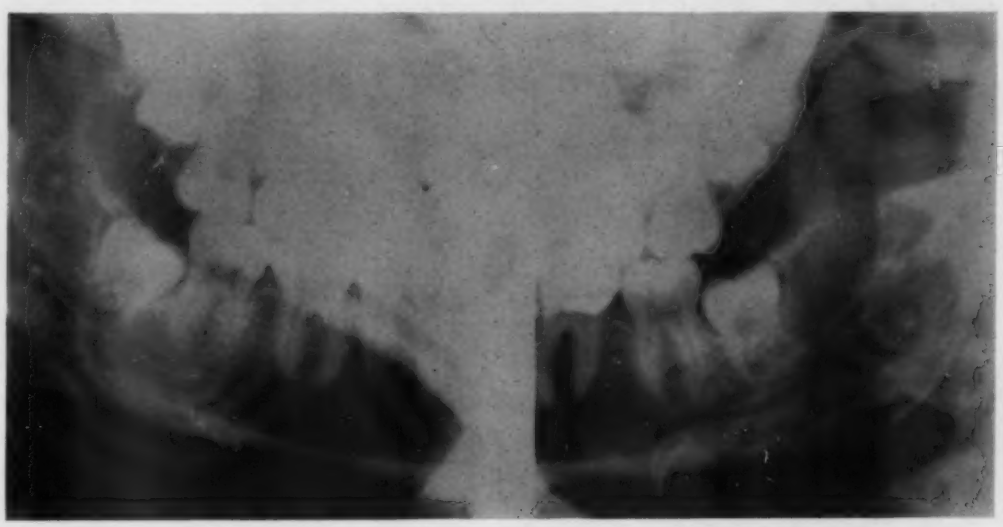

Fig. 6.—The status of the third molars indicating their normal eruption later.

These were continued until the eleventh month of 1945 when they were removed and the case recorded. Records were again made the eleventh month of 1948 which show the status of the case at present. It is quite evident that it has remained stable and roentgenograms of the third molars indicate that they are erupting normally (Fig. 6).

Observations.—Since this case is typical of a very large number which the orthodontist must treat it will be obvious that in some cases the technique described would be varied. Where the diagnosis indicates a *marked forward migration of the maxillary teeth, coil springs would be employed in conjunction with intermaxillary traction and the upper molars* (the coil spring arrangement is indicated in the upper left of Fig. 4) *moved posteriorly until they were in correct sagittal relationship with the lower opposing molars. When properly timed, the erupting bicuspids will usually follow them in an orderly manner or can be positioned with auxiliary springs from the labial arch wire.* The handling of the frontal segment from the standpoint of control would remain the same. Such an arrangement can be modified to include other teeth when necessary. This would of course be the case in "open bites," *where the additional banding of teeth would be mandatory.* The control features of the frontal segment can be made to aid materially from an anchorage standpoint in moving the maxillary molars in a posterior direction, *but it is important during this period when coil springs are used, that intermaxillary traction be made very consistent so that there will be no serious disturbance in the frontal segment.*

Case 2.—A boy 9 years and 11 months of age was placed under treatment Dec. 17, 1947. This *marked dysgnathic anomaly* is pictured by the series of *photostatic records* and casts shown in Fig. 7. The second recording of the face was made on Sept. 22, 1948, and the third *at the end of approximately one year of treatment.* In addition to facial records, denture records were also made at this time. It will be noted that during this period, "the attainment of structural balance, functional efficiency and esthetic harmony" have been very materially advanced. The series of roentgenograms in Fig. 8 reveal some of the steps necessary, such as *the removal of four submerging deciduous second molars.* With such obstructions removed, the teeth in the *lateral segments* will eventually erupt and assume positions of advantage in the occlusal plane. The elapsed time for these adaptive growth changes cannot be definitely predicted but it can be safely assumed that within another six months they will be in place. *In the meantime the other forces of occlusion will be operating for the patient's benefit.*

Observations.—It seems aimless to argue over whether or not, through the use of appliances *per se* we make jaws grow. *The fact that they do grow is apparent to anybody who takes the trouble to record cases accurately.* We do not expect them *to exceed the limits laid down by heredity, but through the use of appliances, and by moving teeth into positions of functional advantage, we undoubtedly create a more favorable environment for supporting structures and get definite growth responses.* All evidence upon this subject points to the fact that *heredity determines how far an organism can develop while environmental influences determine whether it will ever get there. In dentofacial orthopedics* our patients have usually been affected by numerous inhibiting influences including ill health, and our successes will frequently be determined by

our ability to eliminate such influences if they are still present. In this case, and all others coming under my care, appliances are never removed (except for recementation) until active treatment has been terminated. This period is never long. In my opinion, the "on-again and off-again" theory usually starts cases nowhere and ends them up at the same dubious location.

Fig. 7.—Case 2. A series of records of a boy 9 years and 11 months of age at the time treatment was started. These records indicate the changes occurring as the result of approximately one year of treatment.

Case 3.—A girl 12 years of age was placed under treatment March 21, 1944. She was of medium size, small boned, and had delicate features. Roentgenograms revealed the presence of 3 third molars. *She was a definite prototype of her mother whose teeth presented much the same malarrangement as that possessed by the daughter.* It was evident that because of her large teeth and other factors, this case came under *the category where a disproportion between teeth and other facial structures was unmistakably apparent.* Therefore all 4 first bicuspids were removed as an expedient of treatment. Fig. 9 shows two facial records and three denture records, i.e., those made at the beginning of

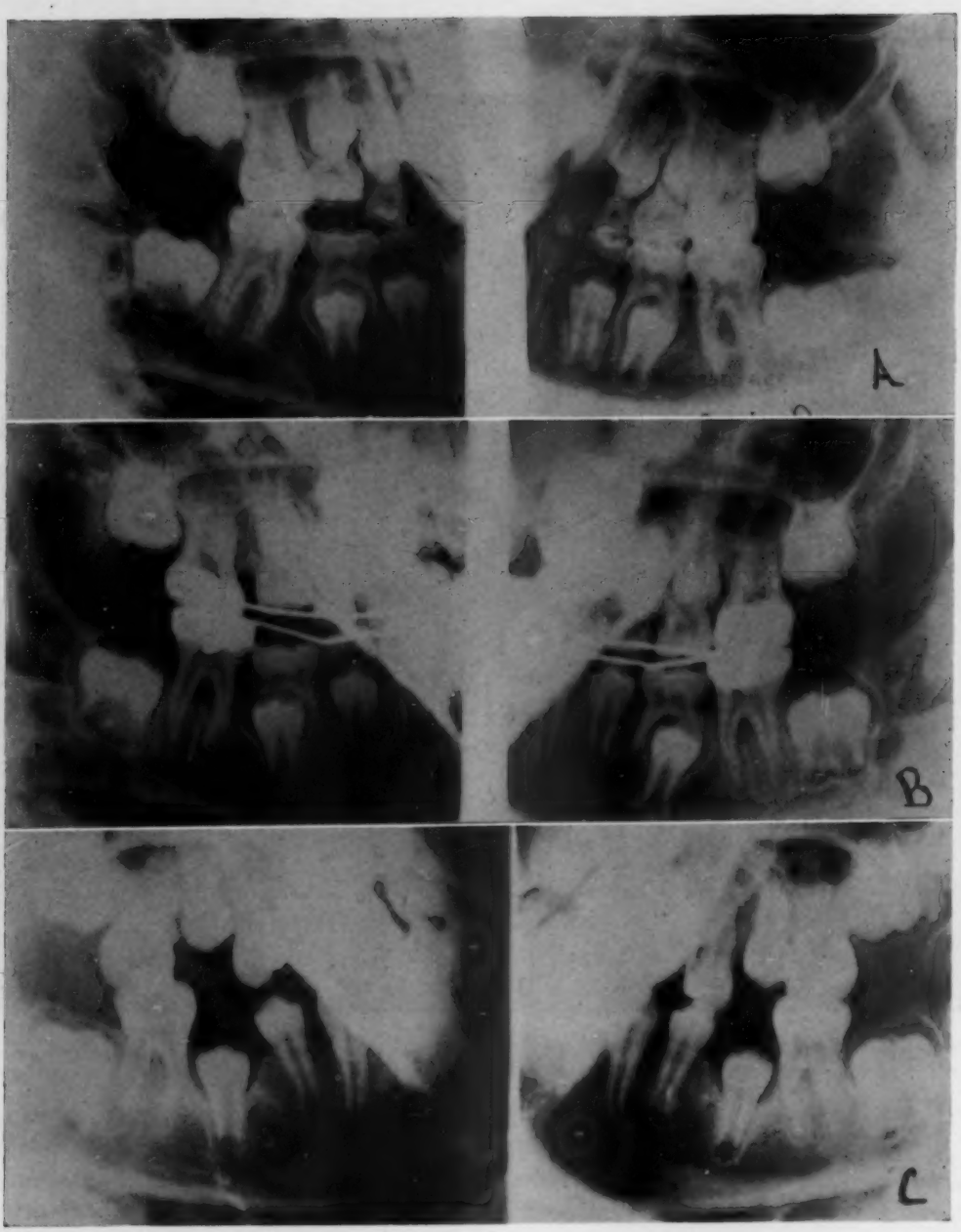

Fig. 8.—A series of roentgenograms revealing some of the steps necessary in the treatment of the case shown in Fig. 7, such as the removal of 4 submerging deciduous molars. The elimination of such obstructions hastens the termination of treatment.

active treatment, after it was terminated (it required just one year) and three years later, and after post-treatment care had been discontinued. Roentgenograms revealed the orderly eruption of the third molars which from all indications can be retained. *The appliances employed shown in Fig. 10 were the same as demonstrated upon the two previous cases, i.e., a labial arch wire upon*

Fig. 9.—Case 3. A girl 12 years of age, where the removal of the 4 first bicuspids was indicated as a part of treatment. Two facial records and three denture records, i.e., those made at the beginning of active treatment, after it was terminated one year later, and three years later after post-treatment care had been discontinued.

the upper teeth, supported from anchor bands upon the first permanent molars and with the frontal segment being controlled by attachment bands upon the 4 incisors. Upon the lower teeth a removable lingual arch wire was used with the first permanent molars supplying the anchorage with attachment bands upon both lower cuspids. These were provided with a means of attaching contractile silk ligatures for carrying the cuspid teeth in a posterior direction into the space formerly occupied by the first bicuspids. By this same means their rotation and other positioning were provided for. The upper canines were likewise

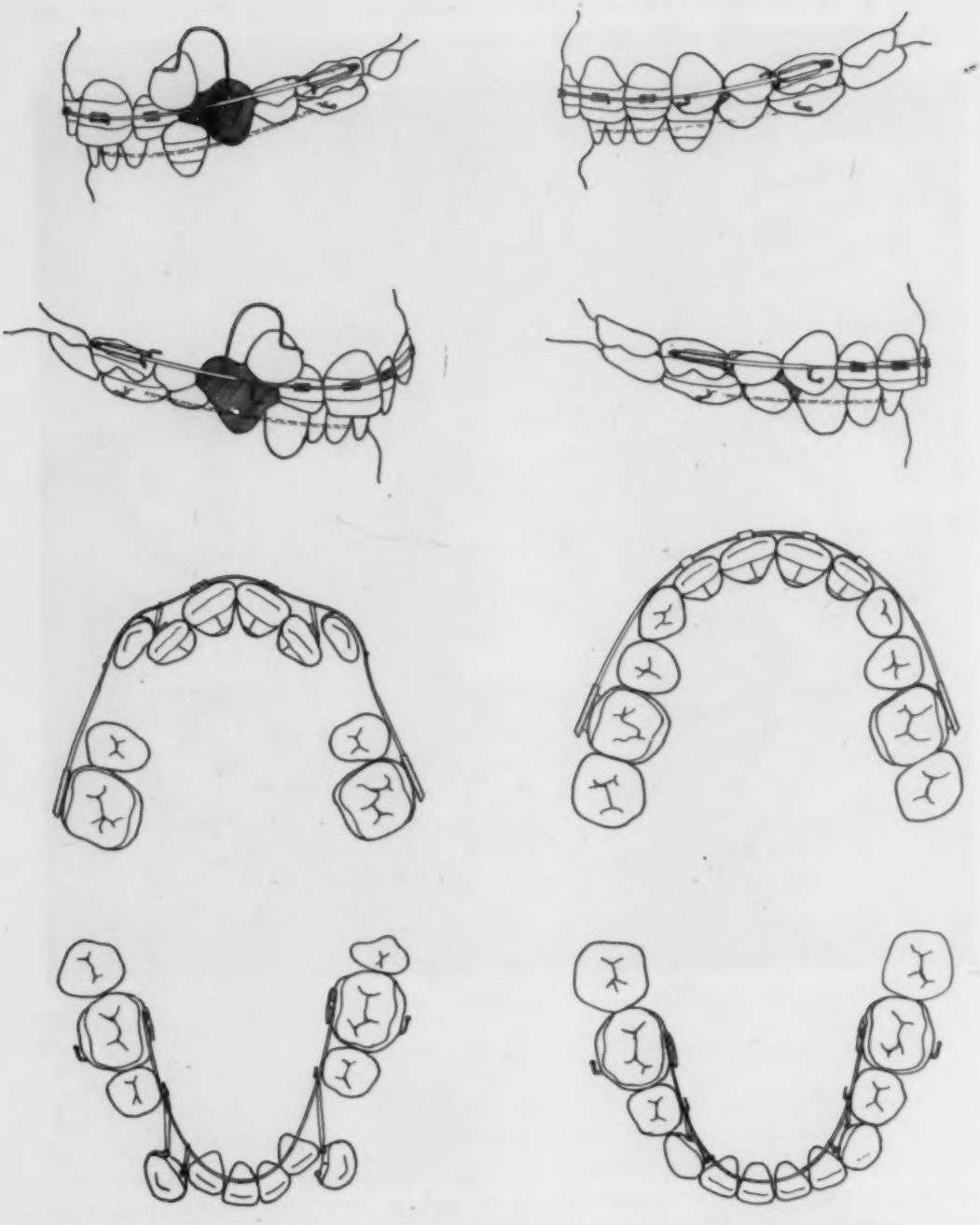

Fig. 10.—Appliances utilized in the treatment of the case shown in Fig. 9.

moved in a posterior direction but were left unbanded as simple auxiliary springs from the arch wire tilted them back into normal upright positions. The alignment of both frontal segments was then completed. A brief period of intermaxillary traction was employed upon the left side so that *the lateral and posterior segments could be placed in normal sagittal relationships.*

Observations.—This case like others was recorded with gnathostatic casts and therefore *the orientation of the denture to the other facial structures is made evident.* In addition, the inclination of the teeth and especially the cuspids which are leaning forward indicates that they should be tipped back into position rather than moved bodily. When this latter movement is necessary, which is frequently the case, they must be banded in a manner so that they may be moved bodily along the arch wire. A plan providing for this type of movement is shown in Fig. 11. This is mentioned, lest the impression be gained that the plan described first would be universally employed.

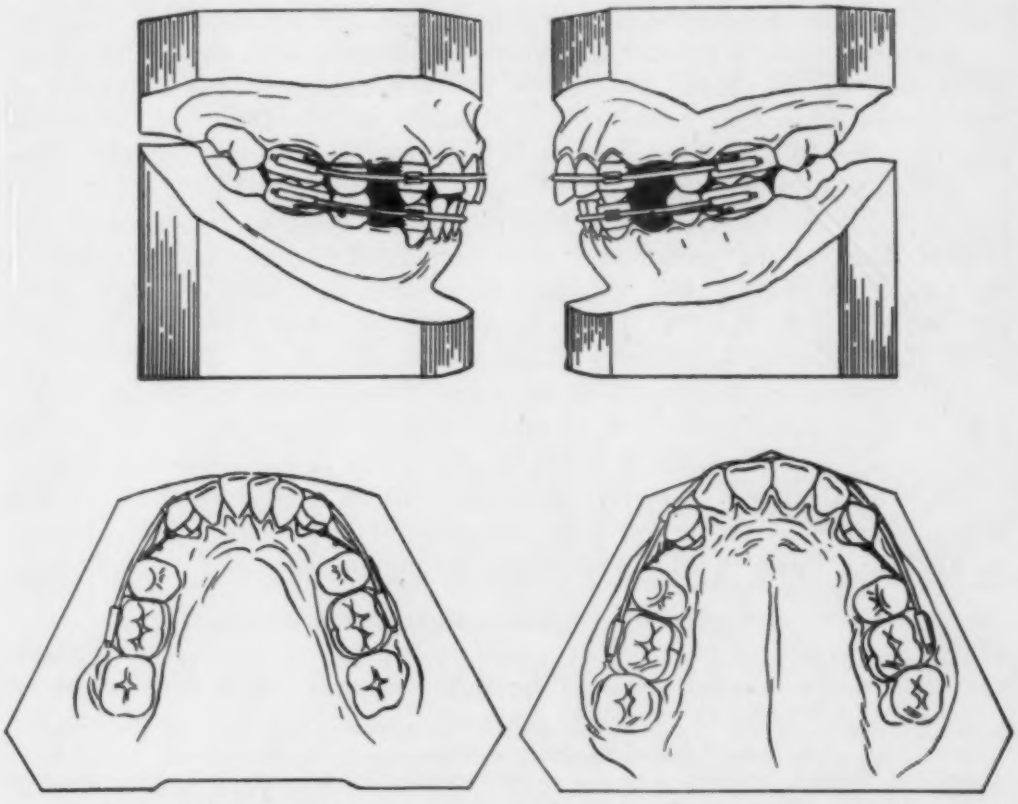

Fig. 11.—Appliances which may be used for the bodily movement of cuspids by sliding them along the labial arch wire. Any one of several standard attachments will provide the source of control.

To summarize the pronouncements made so far, the following facts are given emphasis:

1. One's concept of the orthodontic problem should dictate certain requirements for appliances and the time they may be used with greatest benefit.

2. Growth in the dentofacial complex should be aided and not retarded by appliances.

3. The early restoration of the "forces of occlusion" favors successful treatment.

4. Numerous cases are untreatable by orthodontic means.

5. No appliance is a panacea for the relief of orthodontic problems and the best of them have limited value without competent direction and a cooperative patient.

6. The directive action of appliances should be predicated upon rational diagnostic methods.

7. Active treatment should be an uninterrupted process. The "on-again and off-again" plan leaves much to be desired.

8. Appliances must have stability of attachment, force control, strength with delicacy retained, the best opportunity for cleanliness and inconspicuousness, and real efficiency. These essentials are available in appliances of simple design. It is not necessary to fill a patient's mouth with orthodontic mechanism.

I am conscious of the fact that many will disagree with some of the statements made in this paper. That is fine and in keeping with the status quo of orthodontics which has passed the sophomoric stage. Disagreement brings progress. We no longer have to isolate ourselves into "sects" and give voice to the complacent prayer of the Pharisee, "I thank thee Lord I am not as other men." I am conscious also that numerous sound thinking orthodontists will support many of the principles I have enunciated and become outspoken in the future. During the last few years their voices have been drowned out by the tumult and the shouting, by the enthusiastic voices of those who have followed the dictates of some leader in complete confidence.

In stressing the importance of simplicity in orthodontic mechanism I have done so upon a conviction born of many years of experience. I am not the first nor will I be the last. And finally out of the past the voice of memory brings to me the words of a great philosopher, which were given emphasis time without number by one of our most distinguished orthodontic teachers during his life,[7] the words, "In art—in all things, the supreme excellence is simplicity."

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ORTHODONTICS AND A PRESCRIBED THERAPY

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THE gracious invitation from your chairman for me to appear on your program brought me a genuine pleasure. His request included several specifications, as it were, for the general trend of my paper. It should be something practical, something helpful in daily practice, and an expression from an informed conservative. This, therefore, is a sincere effort to bring you some thoughtful considerations which should be helpful in solving some of our daily problems in routine practice. It is my sincere wish to make it practical, and I trust this paper may serve to stimulate an exchange of ideas in the discussion which follows.

Out of the years of experience which each of us has enjoyed, there have come some profound convictions regarding many of the complex problems encountered in orthodontics. There are problems still to be solved, and our minds are in a quandary as to their ultimate solution. Eminent men have contributed much toward our enlightenment as to the manifold elements which play a part in the developing dysfunction of parts of the face and jaws, which result in disharmony of the facial structures and cause various forms of malocclusion of the teeth. We have enjoyed the helpful cooperation of authorities in numerous related fields, and these splendid influences have brought changing concepts which have greatly improved our approach to treatment. As a result of this cooperation, we see many changes in methods of applied therapy, and a sincere and conscientious effort has been and is being made to improve the quality of our service. The primary purpose of all our meetings and discussions relative to orthodontics is to find the solution of the persistent and often tantalizing difficulties encountered in a variety of cases of malocclusion and to learn how some of our confreres meet these problems in treatment. It would seem that by mere chance our great orthodontists of the past always were successful in the treatment of malocclusion. Perhaps we see cases that are far more varied and complex. Of course, little publicity was given to their failures—such things were not discussed in open meetings! I can recall a meeting of the American Association of Orthodontists, held more than twenty-five years ago, in which Dr. Clint Howard, the first President of the Southern Society of Orthodontists, startled the audience by actually discussing his failures in practice. Inasmuch as Clint was a very distinguished and beloved member and a most skillful orthodontist, his honest confession did much to stimulate careful case analysis and to bring about the application of sound methods of treatment. His frank appraisal of his own failures apparently inspired others

Presented at the meeting of the Southern Society of Orthodontists, Memphis, Tenn., Oct. 11, 1948.

to serious thought which resulted in the advancement of a studied and prescribed therapy for each individual case.

What a change we find today! Dr. Charles Tweed presents one hundred consecutive cases with amazing results. How many of us would care to present even twenty-five consecutive cases we have treated? Whether or not we agree with the methods of Dr. Tweed or with the results obtained, the impressive point is that there was sincere consideration of every case, and he was honestly convinced that his efforts were for the lasting good of each patient. His untiring zeal and his earnestness during treatment should serve as an inspiration to every worthy man engaged in the work of our specialized field.

Another point which strikes me with great force in examples of splendid results among our recognized leaders is their stepping forward in methods of treatment as the searchlight of research discloses more and more of the underlying causes of malocclusion. Mark you, I am not supporting the idea of a universal method of treatment or claiming that there is only one appliance available for the successful treatment of malocclusion, but I do assert that our success in orthodontics is dependent upon the use we make of the available armamentarium in our decision for a prescribed therapy. Changes and corrections must be based upon our findings and planned with assurance that the final result will be stabilized with the help of the forces of occlusion. Were I to express myself concerning the helpful influence of serious study of our cases, it would be to say that case analysis leads to thinking and that thinking brings conclusions which lead to a prescribed treatment plan.

Observation and clinical experience are largely influenced by the ability and sincere purposes of the individual. Moreover, they are tremendously influenced by one's concept or idealism. The concept may be limited; the idealism may persist from an antiquated era. A recently written paper under discussion by a group of orthodontists was highly praised because of its careful preparation, the development of the thesis, and the well-balanced conclusions. However, it was remarked that this beautiful and studied presentation was just twenty-five years too late! It came from another orthodontic era, and our determinations today must be based upon the evidence and conclusive proofs which all the research and successful clinical work of our leaders have made available for our use. It is impossible for me to accept entirely, or limit myself to the generally accepted conclusions of twenty-five, twenty, or even fifteen years ago, inasmuch as these were only the stepping stones in our advancement to an improved concept of today.

We have a well-established concept of the etiology of malocclusion.[1] We have a more adequate understanding of orthodontic problems. We have a more accurate knowledge of bone growth, genetic and environmental factors, the importance of the forces of occlusion, and the structural limitations of inheritance, environment, and functional adaptation. With this knowledge, treatment planning can lead to sound prescribed therapy for individual cases under consideration.

It is a well-known fact, long since established and recognized by biologists and physical anthropologists, that there are certain chronological stages in-

volving the growth of the bony structures of the face, with reasonable physical variations within any individual. As applied to orthodontics, this has been beautifully illustrated in Dr. Leuman Waugh's studies and measurements of his collection of skulls, covering each year of life from birth to maturity. These studies confirm reports of others that there are four periods of facial growth and that prior to or during these periods, orthodontic intervention may best be accomplished in a wide variety of cases. We know that a total mesial occlusion, appearing before the age of 5 years, should be corrected before the child reaches the second growth stage and that correction of a cross-bite should be accomplished as early as possible. Likewise, certain extreme cases can be corrected between the ages of 7 and 9 years, or before entering the third growth stage. Also, many types of cases respond best during the 11- to 13-year stage when the permanent dentition has erupted. Some of the finest corrections can be done in the interval from 13 to 16 years, just prior to terminal growth.

There has been considerable argument for a number of years relative to extractions as an essential procedure in the correction of some cases of malocclusion. The arguments in many instances are as old as orthodontics. Many bitter words have entered into these debates, but it is doubtful if adverse statements have deterred honest men who seek to render the finest type of orthodontic service. A majority of orthodontists are inclined toward a conservative attitude concerning a reduction in the number of dental units as a necessary step in the correction of malocclusion. Most of us are aware of many instances in which a satisfactory correction has been impossible because of hasty decisions to reduce the number of teeth. It always pays to be conservative. Ten to twenty years following extraction and orthodontic treatment, observation will bring a most convincing proof of the present need of a conservative attitude toward elimination of the dental units.

Just how are we going to decide when to extract? Our problem of correction is to change tooth positions, giving developing jaws and growing teeth a chance to mature—even under the influence of a combination of unalterable normal and abnormal conditions—to provide a functional and esthetic occlusion. We must recognize the fact that a combination of normal and abnormal forces has produced a balance with the teeth in malocclusion. We must never forget that the patient must continue life perhaps with limited bony structure to support the teeth and usually with muscle force that is far from normal. At the same time other forces may be normal, and the combination of these forces must be maintained in a balance upon the completion of orthodontic therapy.

One of my first critical observations of any case is to check the axial inclination of the teeth. The inclined plane relationship is next noted. The careful observation of the supporting bony structure and a routine examination of the facial structures, a study of the profile, appearance of the musculature of the face, and finally an effort is made to determine the position of occlusal advantage, so ably described by Dr. Andrew Jackson.[2] Careful notes are made of these findings and are given serious study later when plaster models and photographs are available for the case analysis. If there is an indication of a mesial inclination of the teeth in the lateral segments of the arches, it appears

that the problem is a complex one. If there is a lack of foundation bone, we can anticipate a limited basal structure upon which to position the teeth. The mesial drift of molars, premolars, and canines seems to accentuate limited bony foundation. Whenever I observe this condition, I look upon the malocclusion as a potential extraction case. Other important considerations are involved, and they are more clearly visualized if one prepares a set-up, from a second plaster model of the case, with the teeth over basal bone for a comparative study. This may require the elimination of some units, and it brings a most convincing indication of the probable course to pursue in the treatment plan.

A few years ago I became interested in the Kesling positioner and spent a few days with Dr. Kesling, during which time I went through the routine of positioning the teeth on the models of several of my own cases which were nearing completion. It would be a splendid experience for every orthodontist to learn the value of this procedure, whether he ever used a positioner or not. One is enabled to appraise his own work and to analyze his results in terms of all the more recent findings of a large group of successful men concerning bone growth, inclination of the teeth, basal bone, and many other factors determining the success or failure of treatment. The work of Dr. Kesling was most illuminating. It became very fixed in my mind; as a result of this experience, there is need for a broader concept and a more careful study of our cases before instituting treatment. One essential consideration is an accurate appraisal of bone substance available for the correct positioning of the teeth in each case. The old idea of orthodontic treatment stimulating bone growth is passé in the light of recent additional knowledge available today.

Following my experience with the positioner, I had the privilege of taking Dr. Strang's course, based upon the Tweed philosophy and the use of the edgewise mechanism. This was a striking and deliberate step for one who had never used anything but the labiolingual technique, but I needed the personal satisfaction of being able to form my own opinion relative to extractions. There were a number of other things which recent research had brought out that seemed to be included in the Tweed philosophy, and I sought to add to my knowledge of these developing trends. I was impressed with the sincerity of Dr. Strang and his ability to impress his students with the essentials of the Tweed doctrine. Perhaps among the most valuable things I acquired was a more definite and fixed opinion as to the forces of occlusion and their influence in producing a malocclusion, as well as their continued action following treatment. Therein lies a great consideration when analyzing our cases; we may often find these persistent forces are the cause of the relapses we frequently see.

In the opinion of a large number of conservative orthodontists, there is a feeling that it is time we came to some definite conclusions as to fundamentals and based our procedures upon these facts. In a careful study of a given case of malocclusion, we may find that the axial inclination of some teeth is the result of one or more abnormal forces. Will our treatment include the correction of these abnormal influences? If combined with these force factors we have abnormal bone substance, might we not conclude that nature has done her best under adverse circumstances? Since we cannot produce more supporting

bone and we cannot change abnormal muscles, what assurance have we that we can stabilize the teeth into a functional and esthetic occlusion? One does not contribute anything to orthodontics with the statement that he does not believe in extractions as a necessary procedure in the treatment plan for correction. It appears to me that more orthodontists are extracting in a few cases and that a large number have discovered they should extract in fewer cases. Experience is leading the conservative; the enthusiasts are becoming more cautious.

Dr. Strang's interpretation of these influences and his concept of these problems were most enlightening. All of this gave me much to ponder over, and in all my cases I am giving careful thought to these problems. This has brought me to the conclusion that some of our cases can be greatly benefited if we eliminate some of the dental units before we attempt to position the teeth. I am convinced that there is something to all the truths which have been opened for us concerning the apical base, basal bone, or foundation bone, which appears so important in the Tweed philosophy. I am inclined to believe that all our successful cases over the years have remained stable because in our treatment we positioned the teeth over basal bone within the structural limitations of the supporting bone, and in such positions that the axial inclination of the teeth and the forces of occlusion are in balance, whether we know it or not!

Supplementing these convictions, the recent studies of Ashley Howes led me to a greater consideration of tooth substance and the supporting bone.[3] These entirely different appraisals of the teeth and the supporting osseous tissues give us greater confidence in meeting the problems of practice so important in our treatment planning. There are many men today who resort to extractions to assure these fundamental concepts, especially when the patients are in the terminal growth period. That great teacher Time will disclose for us in a very convincing manner whether we should consider extraction in patients of the earlier age groups. In a number of instances, I have resorted to extraction in cases falling in the 13- to 16-year age group, and the results attained appear to confirm my decisions made at the time of analysis.

Fortunately for some of us, experience with appliance techniques through the years has given us an understanding of both their possibilities and limitations. In spite of a sound treatment plan and carefully designed appliances, in the past, it seemed to me, as well as to many parents, that treatment had been prolonged. I think many of us once felt that we were stimulating the growth of bone and dared not go beyond our concept of the slow process, "the unfolding of nature." Growth of bone would have taken place without the orthodontic appliance. The appliance might stimulate growth of cartilage in the neck of the condyle and this cartilage might ossify while under the influence of treatment, but growth appears to be entirely a function of the individual. The orthodontist positions the teeth and in so doing assists the developing denture to meet its functional and esthetic requirements. Having assumed the responsibility of improving a child's occlusion, let us get down to business and get it over with, giving adequate consideration to all the factors which are inherent in the tissues involved, and the particular problems of the individual case.

In the progress of orthodontics during the last twenty-five years, we have recognized the widely accepted use of the labiolingual appliance. Both the labial and the lingual arches provide the basic support for a large assortment of efficient auxiliary springs. In a wide variety of cases, this appliance is the most ideal for the correction of malocclusion; in some cases it is desired over others during certain stages of treatment or can be used in combination with other types of appliances, such as the twin-wire arch. Success in their application has been largely dependent upon a sound treatment plan, careful construction, and skill of the operator. However, in the minds of many there have been doubts as to the efficiency of the appliances when compared with the results obtained by other appliance techniques. In orthodontics, as in every other activity, the heights of accomplishment are reached only by the masters of the art. We only have to refer to the splendid achievements of Dr. Oren Oliver to acknowledge the most outstanding results during many years of conscientious and meticulous efforts with this appliance. We well know that the finished results of his work far surpass the results of most of those who confine their appliance therapy to this method. It is universally recognized that Dr. Oliver popularized the labiolingual technique and developed it far beyond the ideas of the beloved originator, Dr. John Mershon.

This reminds me of a statement made by Dr. George Crozat many years ago. Dr. Crozat was lecturing to a class relative to the construction and use of a certain appliance. He stated that in his hands he found it possible to accomplish certain results with this particular technique. This brings in one most important factor in our work—the personal equation. On the other hand, men's minds, their skillful hands, and their varied concepts of the problems of orthodontics play an important part in treatment. One is confronted with these varied concepts and might compare them with the major differences between allopathic and homeopathic medicine. Unquestionably, there is a sound basis for both systems of medicine. Likewise, we can justify various methods in orthodontic treatment. I must admit that I am much like a very dear physician friend who has long used some homeopathic prescriptions for certain conditions; he has found them preferred over the usual methods of treatment which allopathic medicine suggests. He terms these the useful remedies in his bag of tricks.

Each of us has found useful ideas, taken from one method of treatment which could be applied to some other specified method, and they were most useful. It is very simple to add auxiliary attachments to the labiolingual appliance and position teeth into perfect arch form, even after extracting the first premolars. The edgewise mechanism is not the only appliance that can be used successfully in extraction cases. Many of the fine ideas picked up in the Strang course have brought splendid results when used in conjunction with the labiolingual or the twin-wire appliance. How, when, and where to use these methods or variety of auxiliaries are essential in formulating prescribed orthodontic therapy.

In my search for a variety of methods which would aid me in the treatment of some of the trying individual problems encountered, it was most profitable

to take a course given by our good friend Dr. Joseph E. Johnson on the philosophy of the twin-wire appliance. I was tremendously impressed. It was found that this mechanism would accomplish much that I found difficult and slow to secure with my labiolingual technique. In those cases where reciprocal force was desired, its mild pressure was exerted upon a number of teeth, just as the edgewise mechanism, but to me it was because of the gentle pressures exerted under a much better control. Dr. Strang had stressed anchorage as tremendously important. Again, in the Johnson course, anchorage became of prime importance. The little coil springs had important functions, but they added efficiency to the appliance when indicated only if suitable anchorage was used. In the edgewise appliance, the arch wire is an amazing force when properly adjusted. In my hands I have found the twin-wire appliance more desirable. It has many variations which are most useful. For instance, using a ribbon arch wire drawn through the end tubes gives one an entirely different appliance. These ribbon arches may be used in sizes that closely approximate the edgewise arch and can be utilized for similar action—torque and tip-back bends.

Even in this hurried presentation of the measures found suitable in various stages of correction of malocclusion, one cannot pass up the guide plane developed by Dr. Oliver. In certain cases, particularly Class II, Division 1, it is amazing in its results when properly used. Its success in my hands has been limited to those patients whose mental attitude is equal to the demands of the moment. The bite plane is also one of our most useful and dependable auxiliaries for certain types and conditions of malocclusion. In both these auxiliaries, we make use of available forces of occlusion for tooth movement. With their use, rapid tooth movement and changes in the necks of the condyles are nothing less than spectacular.

The cases which I purpose to show are not presented as spectacular ones, but rather indicate certain stages at which time we may anticipate the most favorable correction.

CASE REPORTS

Case 1.—M. A. C. This case belongs in the second growth stage, mixed dentition with a Class II, Division 1 type of malocclusion. Some would leave this child alone until the deciduous teeth are replaced by the permanent successors. I believe we can assist nature at this stage. By making the necessary corrections, this child's teeth assumed their normal relation, and myofunctional exercises aided the development of normal muscle tone. Retention held as a passive force, permitting a more normal growth until the permanent teeth replaced the deciduous. Any need for slight corrections during the third growth stage is usually of short duration. (Figs. 1, 2, and 3.)

Case 2.—S. B. This exemplifies the preventive value of early treatment. The response to treatment was most satisfactory, using the labiolingual appliance. Upon completion of the basic treatment, a positioner was used for four months, followed by Hawley retainers for one year. The final results assure a functional and esthetic denture. (Figs. 4, 5, 6, and 7.)

Fig. 1.

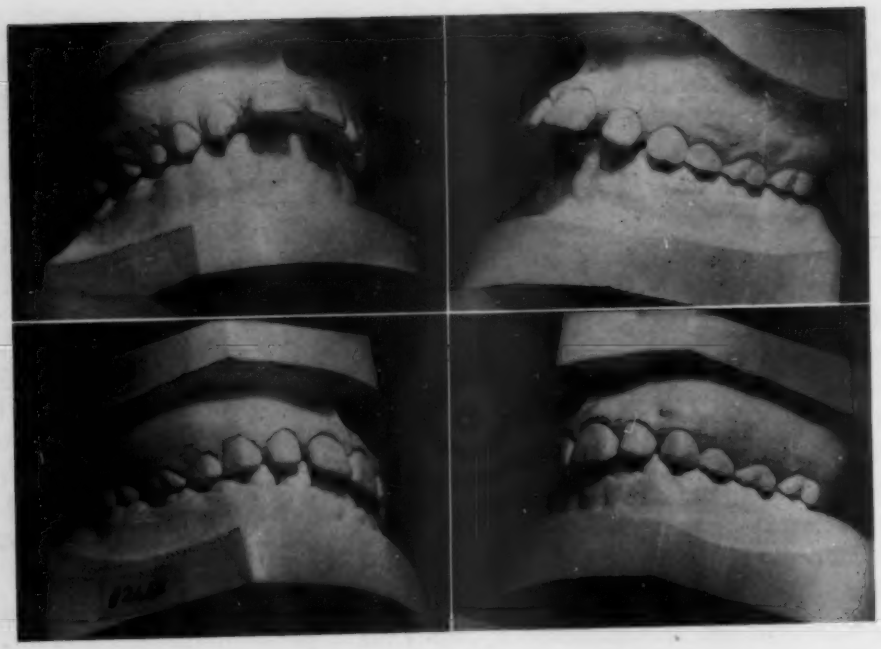


Fig. 2.

Figs. 1 and 2.—Case 1.

Fig. 3.—Case 1.

Fig. 4.—Case 2.

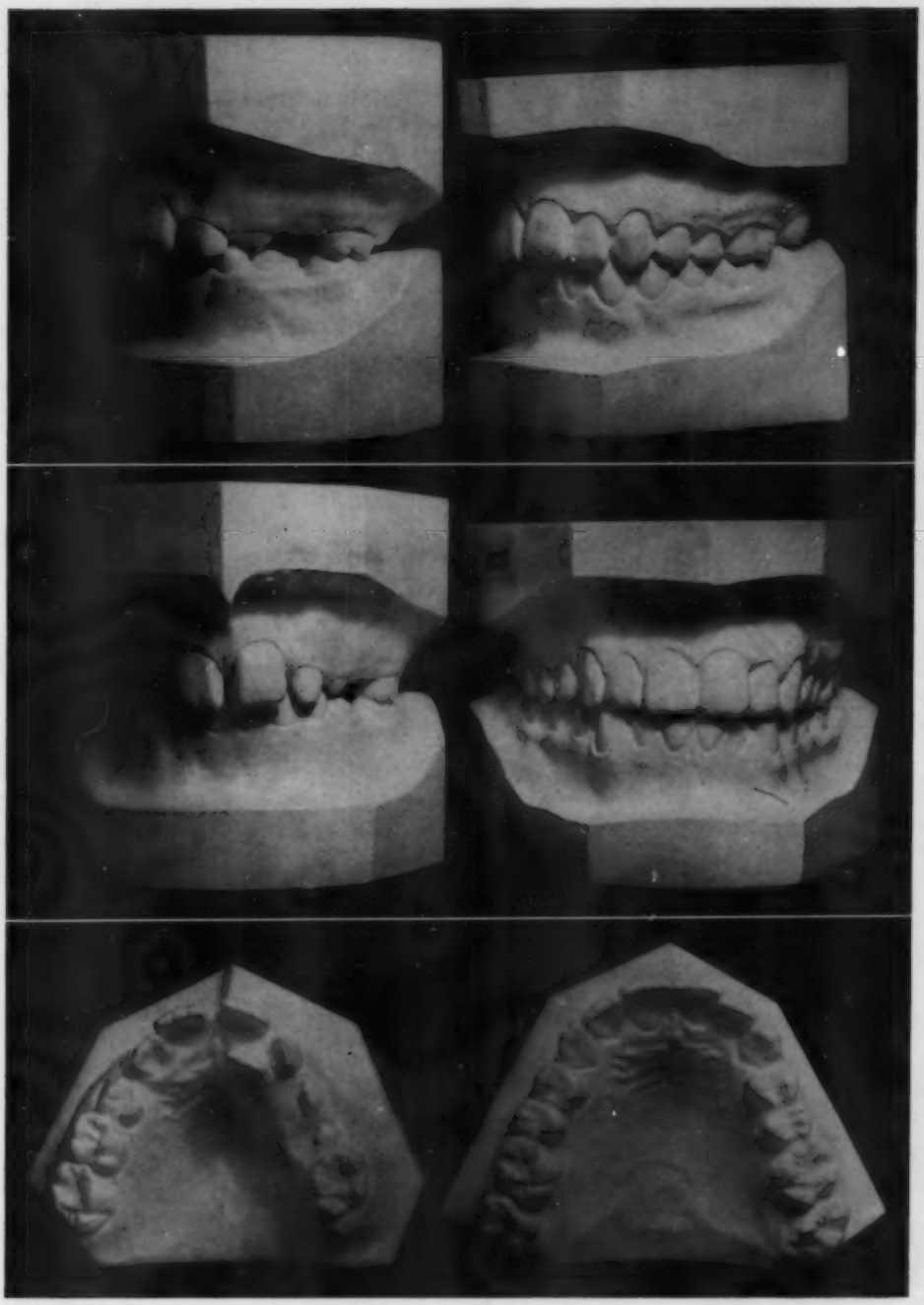


Fig. 5.

Fig. 6.

Fig. 7.

Figs. 5, 6, and 7.—Case 2.

CASE 3.—T. F. This case belongs distinctly to the 11-13-year or third growth stage. Treatment was concluded in fifteen months. The nature and degree of response were accelerated by or associated with the age of the patient. (Figs. 8, 9, and 10.)

Fig. 8.

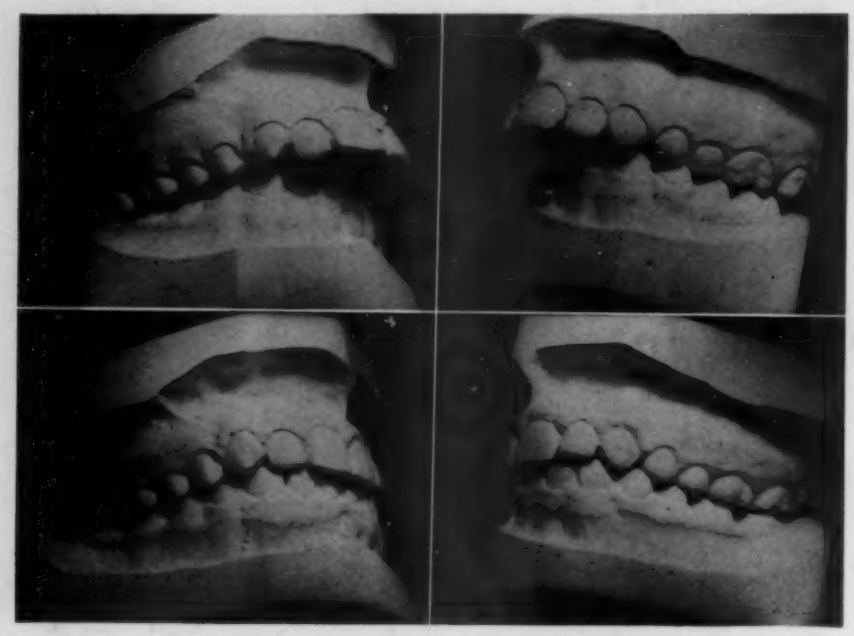


Fig. 9.

Figs. 8 and 9.—Case 3.

Fig. 10.—Case 3.

CASE 4.—C. E. Original models show definite maxillary protraction at 9 years, 6 months of age. Orthodontic intervention at that age would be of questionable value. There is little if any advantage to be gained by early treatment in this case. It is far better to wait for full permanent dentition because of definite signs that extractions would be necessary. Many believe that this

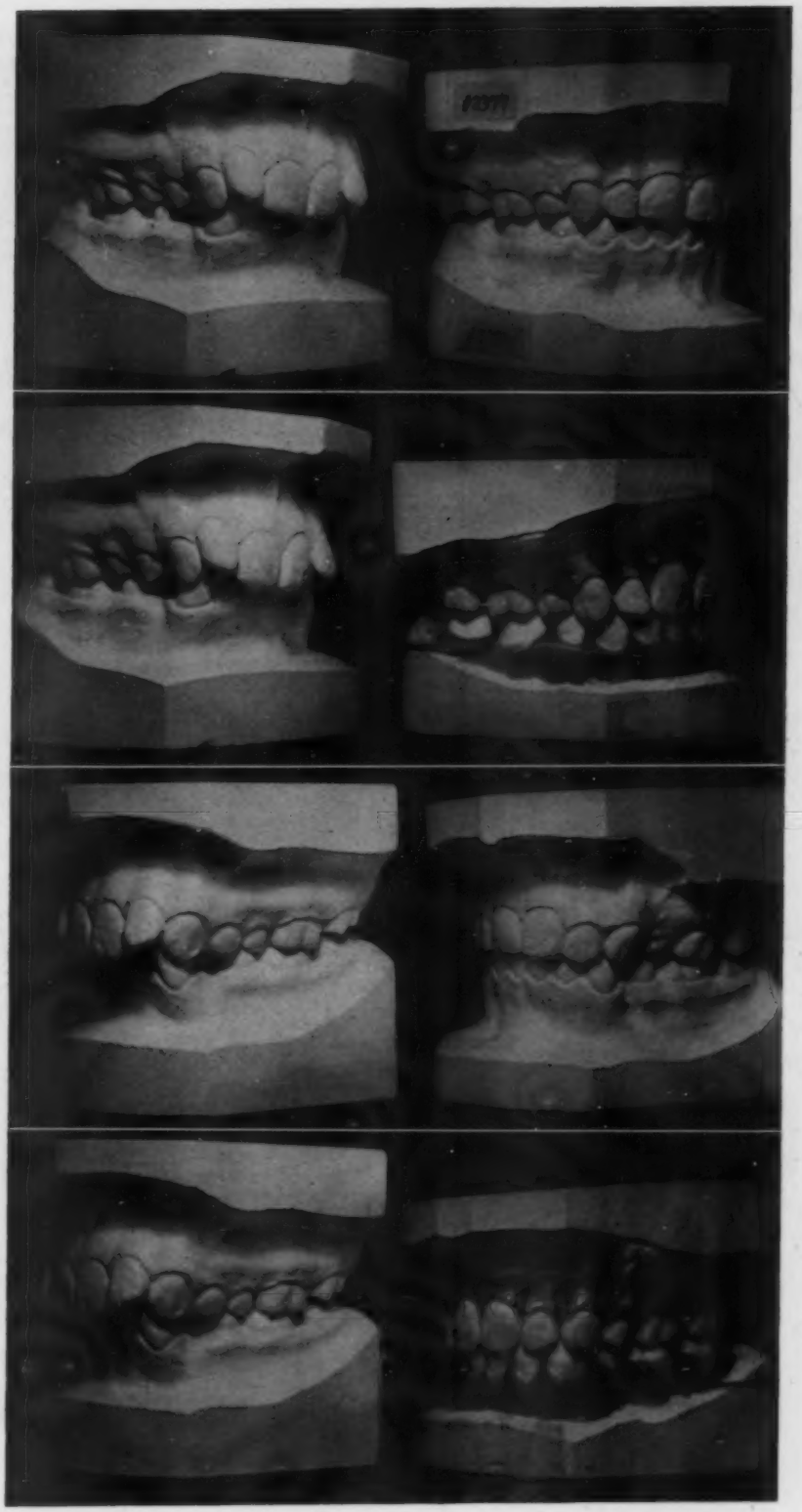


Fig. 11.

Fig. 12.

Fig. 13.

Fig. 14.

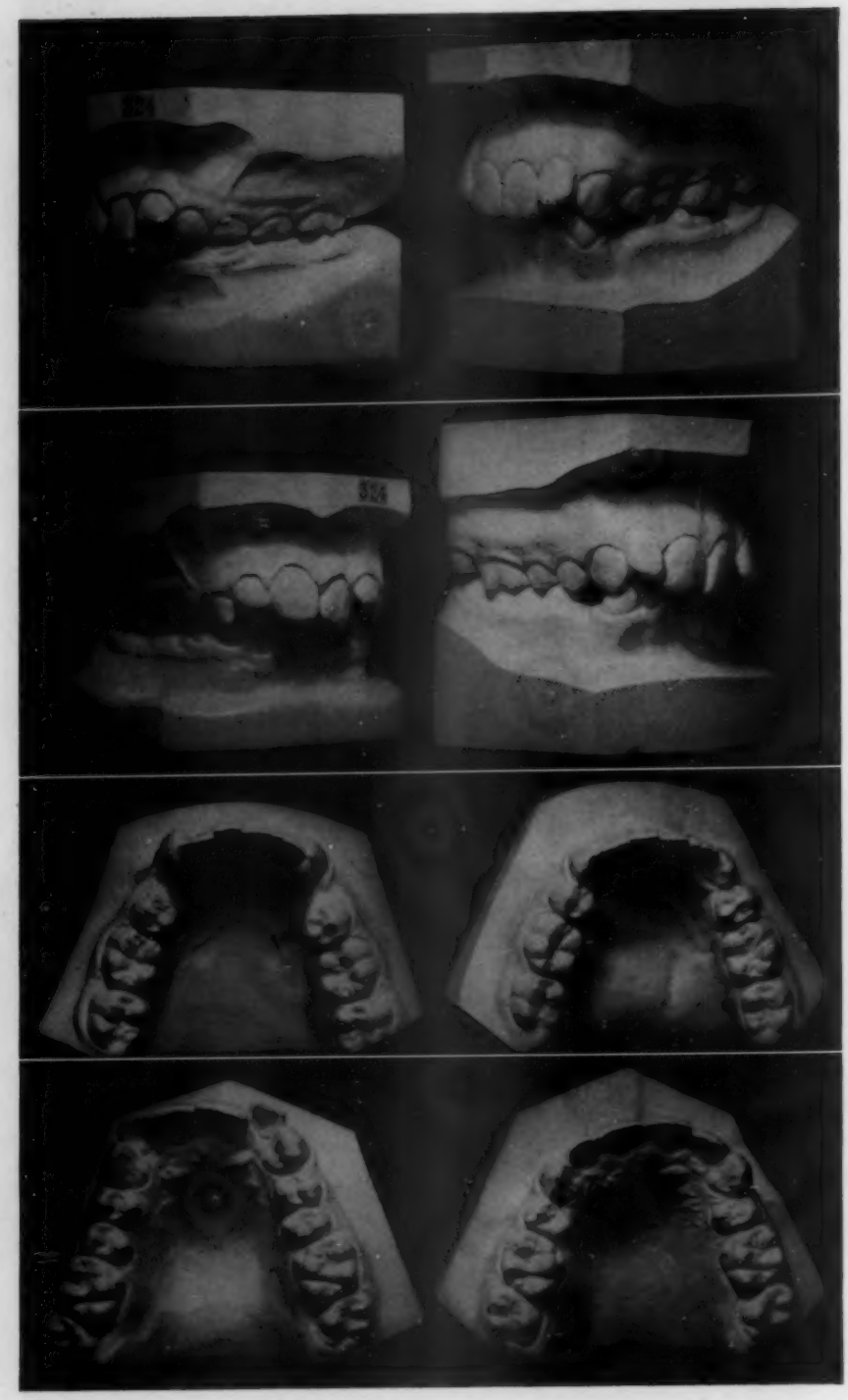
Figs. 11, 12, 13, and 14.—Case 4.

Fig. 15.

Fig. 16.

Fig. 17.

Fig. 18.



Figs. 15, 16, 17, and 18.—Case 4.

is the earliest age at which extractions would be favorably considered as a matter of principle in so far as any disharmony between volume of tooth substance and basal bone is involved. This case was treated with the labiolingual appliance initially, and final positioning of the teeth was accomplished with the twin-wire appliance. Following this basic treatment, exercises with the positioner were instituted for a period of four months, after which the case was placed in retention, using Hawley retainers. (Figs. 11, 12, 13, 14, 15, 16, 17, and 18.)

In these days of world chaos and imbalance of world thinking and activity, one finds these influences reach into the lives of all people. So much is this manifest that life's standards and national thinking are jeopardized. Unless a proper understanding of values is regained, this trend will engulf professional standards. Many men are extending their endeavors into specialized fields as their motives are stimulated by the trends of general national thinking and doing. One of the most critical movements of today is the dangerous attempt of the "do-gooders" and bureaucratic agencies of government, especially those of pinkish hue, to put over a scheme for socialized medicine and dentistry. They reach into the professions and influence the thinking of men who would easily believe their professional security would be assured through such a program. They are looking for an easy way to promote themselves and their professional work. The greatest caution must be used to keep such types of men out of orthodontics. What has this to do with a prescribed therapy for orthodontics?

In a recent sermon, the distinguished minister Dr. Oscar Blackwelder expressed some thoughts which are applicable to our subject. Dr. Blackwelder said: "In my judgment, one of the greatest problems confronting our Nation today is that so many people are working as little as they can to get as much as they can with no thought for the excellence of their product and they are missing so much of the joy of life."

Life's greatest values come to us through the moral and spiritual influences found only in the prescribed codes of upright thinking and living. In all our activities, the joy of living comes through our efforts to pursue the highest and noblest aims of life. Hippocrates laid down a code for medicine ages ago which has directed the profession to the highest peaks of achievement—it is prescribed guidance for medicine. In this day, when trends may have such a profound and dire influence upon group and national thinking, let us pause to give thought to just what our greatest achievement can be in our special work. Can it not be that through the highest ideals and prescribed thinking we can hold orthodontics exclusively for those who would build into it a higher type of service for greater joy within and greater happiness for those whom we serve? Orthodontics is most demanding of those who would serve it best. The highest type of service calls for excellence of service with no thought of the gains; demands the loftiest ideals for the greatest happiness to those we serve. It means a prescribed direction of our efforts in achieving such a high level of service. Let us give our greatest efforts to serious study, conscientious effort, and a sound, prescribed orthodontic therapy.

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DISCUSSION

Lowrie J. Porter, New York, N. Y.—A short time ago I read a story of a writer who was continually thwarted in his efforts to originate ideas for story writing because of a lack of congeniality in his home. He finally realized that this disturbing family atmosphere was because of his own frame of mind. He was the family barometer. When he changed, the family changed and the whole world around him changed. Realizing this influential responsibility, he decided to reverse his mental attitude in life and to keep in mind two main thoughts: "the best is yet to come," and "my happiness and that of others depends entirely upon *me*." This reversal of outlook resulted in a change from boredom to happiness; to a feeling of buoyancy and animation; to a mind that was clear and concise in its thinking. From that moment on his ideas improved, his efforts bore fruit, and he eventually became one of our great and noted story writers.

I mention this because it has been my belief for many years that many of us in orthodontics have continued in a thwarted manner, constantly butting our heads against stone walls in the dark, unwilling to see the light in another direction if we would only change our course a little from time-worn paths on which we have encountered stones and ruts and insurmountable obstructions.

I greatly appreciate the honor of having been asked by your program committee to discuss this splendid paper of Dr. Leigh C. Fairbank, but I must admit that after promising to do so I had a dual feeling—one of depression and one of elation. The depressed feeling was because I did not know just what was going to be written and I questioned whether I would be able to discuss it intelligently. The second feeling of elation came about two weeks ago when I received a copy of his paper and I realized for the first time that our ideas coincided perfectly. There was a certain psychic feeling involved, for it was as if he had written the thoughts that were hidden deep in my mind. I learned long ago that no one can intelligently discuss a subject with which he is not familiar, so it was a great relief to know that I had only to express my sincere beliefs in orthodontic principles to discuss this paper intelligently and effectively, a paper which I believe is most timely, well thought out, firm in beliefs, but also liberal to essentially progressive thoughts even though they be contrary to various beliefs and teachings of the past. It is another case of a swinging pendulum gradually settling into a steady progressive stride, keeping in the middle of the road and not swinging too far to either the left or right.

I must say frankly that I believe Dr. Fairbank has fully accomplished the introductory thought in his paper in which he planned to make "efforts to bring forth thoughtful considerations of daily problems which should be helpful in the daily routine of office practice." I reread his paper three times with the definite knowledge that I gathered more meat for thought with each reading. It will be my attempt in this discussion to bring out further thoughts which may be helpful in daily practice in the hope that you may feel that our trip to this splendid meeting has been worth while.

It is quite true that there have been great contributions through research and clinical evidence which have given us much greater knowledge of the biologic and etiologic factors which have influenced the causation of facial and dental maladjustments in the children whom we have the privilege and the sacred responsibility of helping to guide into a condition which we believe to be normal for those individuals. We must always realize that this responsibility is entrusted to us because of a sincere belief on the part of our patients that we are following the latest and best thoughts of our profession as bounded by present-day

knowledge and backed by science, research, and historical clinical evidence of successes and failures in treated cases. This, however, can only be the case if we are *willing* to be guided by these scientific developments and this clinical evidence of successes and particularly of failures.

Dr. Fairbank states that contributions from eminent men have so enlightened us that they have brought changing concepts and have improved our approach to therapy. I wish that were completely true. There is no doubt that many orthodontists *have* improved their therapy because of changing concepts, but unfortunately we still have those who continue to disregard the limitations of treatment and the necessity for a definite consideration of the amount of tooth substance in its relation to alveolar and basal bone growth. This bone growth is limited by and completely surrounded by strong muscles exerting very definite pressures. These muscles have established a definite arch shape for each individual, a fact which makes the usual arch predetermination a false and futile ideal which will eventually be completely upset by muscle pressures if it varies greatly from the arch shape determined by nature for each individual.

I often think of Dr. Frederick Stanton and the arch predetermination charts which he made and demonstrated to determine what tooth movement was necessary for each individual case. If there is such a thing as arch predetermination, I believe Dr. Stanton was more nearly right than any other orthodontist has been, and yet his ideas were not followed and he was ridiculed in many instances. Years ago I bought one of Dr. Stanton's surveying instruments and in a few cases I followed his surveying principles. His primary thought behind the surveys was to give the least amount of tooth movement to any individual tooth to attain a normal occlusion. Perhaps he never realized it, but his maps showed that he was attempting to leave the shape of all arches as nearly as possible the same as had been formed by nature. These arches had been formed through muscle pressures. Some were long, narrow arches; others were broad and short but they were characteristic and normal for that individual. The more nearly we can stay to that individual normal the greater is our possibility of retention and the less our end result will be disturbed by muscle pressures, with resultant case failures. I believe this is very important in our desire for permanency of results. This desire for maintaining this individual arch shape is, in my opinion, one of the strongest reasons for believing in tooth extractions in orthodontic therapy. If the muscles have formed a bone structure too small to accommodate the teeth of an individual, it is hopeless for us to try to develop a large enough arch to accommodate these teeth. It is far better to remove dental units in our attempt to establish a balanced dental apparatus. The teeth should be adjusted to fit the supporting bone structure rather than attempting to develop the bony processes sufficiently to accommodate teeth which may be too large to fit into the alveolar arch which nature has determined as normal for that individual.

Dr. Ashley Howes has demonstrated the close relationship between the arch width and the supporting bone structure. He has carefully and reliably shown that lateral development of arches beyond the supporting bone structure eventually results in failures which we have all experienced. His measurements give a definite idea of the limitations of tooth movement for a favorable prognosis. Some have questioned the accuracy of his measurements of the apical base line, but for all practical purposes it will serve as a definite guide for the limitation of tooth movement.

If we are limited in lateral development then we must resort to one of two other courses—either the arch must be lengthened or teeth must be extracted. If the lengthening of an arch is limited we are then left with only one alternative, extraction. If we wish to avoid extraction, we must attempt arch lengthening.

We must not lose sight of the fact that growth is continually changing facial bone structure, but we must also realize that the anteroposterior facial bone growth is developed posteriorly to the body of the mandible and maxilla and is not a lengthening growth *within* the previously developed bony structure. There is practically no lateral development of the arch from the time of eruption of the anterior permanent teeth to the adult stage. The deciduous arch at 7 years of age will be practically identical to the adult arch in the same individual, forward to the mesial of the first molars.

Inasmuch as Dr. Fairbank has endeavored to have his paper contain thoughts which would be helpful in daily office practice, I am going to take time this afternoon to show you a few slides which demonstrate the method I use for the lengthening of arches. I prefer this method to some other methods for the following reasons: (1) it does not have any attachment to the anterior teeth and consequently causes only a distal movement of the upper buccal segments with the least possible forward movement of the lower arch; (2) it is enjoyed by patients because it is largely inconspicuous; (3) it tends to raise the bite as the buccal segments are brought distally to establish a normal mesiodistal relation; (4) it can be used equally well and efficiently in either bilateral or unilateral distoclusions; (5) it is particularly useful in cases in which there has been a mesial drifting of upper buccal segments.

Dr. Fairbank mentions the few times that failures have been discussed in open meetings. I can recall my admiration for Dr. Donald Sterrett of Erie, Pennsylvania, who read a paper on case failures at a meeting of the American Association of Orthodontists about twenty-five years ago. It was very impressive to me and was very valuable to me as a young man in my early career. Not long ago I heard another paper about failures and I wondered in my mind just how we determine a failure. I do not believe the type of appliance used will either cause or prevent failures, providing it has been used efficiently.

It is only an equalization of muscle pressures that is going to leave an arch in a stabilized position. We frequently see a slight crowding of lower anterior teeth after retention and we call this a failure. Some feel dissatisfied with this condition and resort to extractions to prevent it. Dr. Allan Brodie has mentioned that 8 mm. of tooth substance is removed in many cases by some men to gain 1 or 2 mm. Now let us analyze just what causes this crowding of lower anterior teeth. Extractions shorten the arch which tends to cause less pressure from an anterior direction from the orbicularis oris muscle. This may possibly help to prevent crowding, but there can also be a lateral pressure which tends to narrow the arches. In that case, crowding is going to result regardless of how we treat a case unless the tongue muscle is sufficiently strong to prevent this arch narrowing. I believe the most vicious cause of crowding of lower anterior teeth, however, is from the extent of overbite. If we could keep the bite open as we have treated it, these teeth should not crowd, but as soon as muscle pressures, over which we have no control, tend to close the bite, the lower anterior teeth become crowded while the upper arch may stay in perfect alignment. This is because the upper canines press excessively on the lower canines and something has to move. The upper canines usually do not move laterally because of muscle pressure, while the lower anterior teeth slip by their contacts and become crowded. This type of failure comes in some cases and not in others. It comes because of an uncontrollable muscle pressure; it happens whether we extract teeth or not and regardless of what type of appliance we use. We must admit that this is a failure, but I do not believe it is one that we are going to overcome in all cases. When this happens due to the overbite, we and our patients are going to have to accept it as an uncontrollable condition.

If teeth have been moved too far forward beyond the limits of bone growth and beyond the point of labiolingual muscular equalization, there will then be a crowding from lip muscle pressure. This latter type of failure may be aided by tooth extraction, while extraction in the overbite case will not prevent this condition.

Crowded lower lateral incisors often occur from occlusion with the enamel bulge on the distolingual of upper central incisors. When this occurs the lower lateral incisors will settle lingually and yet be in perfect occlusion with the upper teeth. This can be relieved in some cases by grinding this enamel bulge, but frequently it is impossible to prevent and I do not believe extraction will benefit this so far as stability is concerned.

Dr. Fairbank mentions the exhibition of one hundred consecutively treated cases by Dr. Charles Tweed. A beautiful exhibit of five hundred cases was shown by Tweed followers at the last meeting of the American Dental Association in Chicago. There is no question but that these men are producing beautiful results, and I believe that the retention of their cases may, after the test of time, remain in better condition than that of the average group

of cases treated by other methods. Let me tell you why I believe that is true. Retention has no regard for the type of appliance used. It is the end result gained by treatment that is the determining point. As Dr. John Ross has stated, "A clever wire bender and band maker does not mean a good orthodontist."

Many of us have used appliances which just pushed the teeth to where we thought they might fit together well and have entirely disregarded such things as bone structure and muscle pressures. Many of these cases will not stand the test of time. I do not use the edgewise mechanism, although I have very profitably taken Dr. Strang's course in the Tweed-Strang philosophy, but I greatly admire the study and thought given to the treatment of cases by those who are following the teachings of Tweed and Strang. I do not refer to the extraction theory but rather to the thoroughness with which these men go into their treatment planning. There is no hit-or-miss philosophy in their proceedings, whether we believe they are in fact right or wrong in their case analysis. There is a very careful study of each case before treatment is started. There is a definite study of supporting bone structures; great stress is laid on the forces of muscle pressure; these men have become most conscious of biologic and environmental influential factors, and they also have a high regard for facial changes. It is because of this thorough study of cases and a carefully planned therapy that I believe they are frequently getting better and more stable results than most of us are getting. I do not agree with the high percentage of extractions advocated nor do I believe that all faces have been improved by following the extraction theory. I fully believe that many faces are far worse than they were originally and that many faces will continue to get worse as the child grows into adulthood. I believe that many men following this high percentage of extraction are going to live to regret it, and I consequently prefer to remain in the conservative category.

A very close friend of mine, who is one of the most conscientious men in this country and one whose articles on treatment you have all admired, told me a few days ago that he was sick over one case in which he had extracted four premolars. The child went to visit friends this summer and a dentist friend of theirs said to the child and family, "What in the world has that orthodontist been doing to your face? It looks as if someone had kicked you in the mouth and knocked the whole front of your face in." He did not realize what a reaction this would produce in the child. After the parents had listened to the child cry herself to sleep for several nights, they came to the orthodontist wondering what could be done to get her face back to its original condition. The orthodontist, a most careful, conservative, honest man and a splendid operator, was completely defenseless for the teeth were out and could not be replaced. If this condition is so noticeable at 14 years of age, what will be the condition of her adult face?

On the other hand, when anyone makes the statement that there are no cases requiring extraction, he is just as wrong or perhaps more so than the fellow who says, "If there is any question about it, extract." I have heard both of these statements from very eminent men. These are not the teachings that Dr. Fairbank refers to when he says, "Contributions from eminent men have so enlightened us that they have brought changing concepts and have improved our approach to therapy." The great danger of advocating extraction is the promiscuous extraction by ill-advised dentists who may believe that this procedure is a cure for malocclusion and is an easy way out.

In the last analysis, I believe we are all going to agree that there definitely are cases requiring extraction, for we are going to be unwilling to follow along with such a large percentage of case failures as has been true in the past. Extraction will help some of these failures but it will not prevent all failures by any means. It is to be hoped that we may in the near future arrive at some definite criterion which will give us positive and unquestionable indications for or against extraction in each individual case.

Dr. Fairbank mentioned an important point when he stated that case analysis leads to thinking and thinking brings conclusions which lead to a prescribed treatment plan. Our whole success, I believe, depends on our careful treatment planning. We now know many of the causes of failure and we at this time have a great opportunity of not stepping into the

pitfalls of our predecessors if we only think things through carefully. We must not be dogmatic and stick to old theories because we are unreceptive to new ones. On the other hand, we must be wise enough not to go too far with new theories until they have been tried and proved beyond doubt. There must be some solution which can meet the approval of all sensible thinkers, and it is about time that orthodontists should be able to come to some mutual agreement on orthodontic principles and theories of therapy. We are being watched by the public and the great dental profession. Orthodontics can either be a great health service or it can be a racket. Sound, sane, careful thinking and planning by able and reliable practitioners should enable us to reach some worthy and justifiable conclusions which would put orthodontic therapy on a common and solid ground. Opposite and diversified opinions in a profession do not lead to confidence by the profession or the public.

It is with this hope in mind that Dr. Fairbank has stated that while there have been arguments and bitter words over extractions, still these have not deterred honest men who are seeking to render the finest type of orthodontic service. He mentions also that the vast majority of our serious students are conservative. That is a good sign. To be conservative one does not have to be dogmatic. One who never changes never progresses. We who are open-minded but slow to make sudden and drastic changes in therapy cannot be classed as an opposing force. We feel as our Secretary of State General Marshall did when he stated before the United Nations Assembly, "Do not let our patience be interpreted as a sign of weakness." We know that there are limitations to stability in the treatment of some types of cases, regardless of how much study has been given to them, regardless of our changing concepts, regardless of the type of therapy used, and regardless of extraction theories and practice. This lack of stability is often because of our lack of control over powerful uncontrollable factors. We have seen many of these failures and know now to some extent in which cases we are going to encounter them. Why not then, for the good of the patient and for the good and welfare of our profession, tell our patients of these possibilities of failures before we start treatment? Honesty is always the best policy, and we gain the confidence of our patients when we warn them before treatment of the risk of eventual failure in certain cases. If they start treatment under those conditions they will not be surprised or disappointed; regardless of the end result, orthodontics will have been elevated in the field of science and public welfare.

Another point which appealed to me in this paper was Dr. Fairbank's statement that we are tremendously influenced by our own conception of idealism. Dr. Tweed says he has always had a picture in his mind of an ideal face. His ideal may vary from yours or mine and we may wonder who is right. I do not believe we can have any set rule that all procumbent incisors must be uprighted to an approximate 90° angle to the mandibular base plane. In some cases this would ruin a beautiful profile. Neither do I believe that placing all teeth in this position is going to prevent their returning to former positions from an equalization of muscle forces. That procumbency may have been normal to that individual for it may have been in perfect muscular balance. Uprighting all incisors would let the lips retrude in some cases and cause a so-called dish face. Cases with a protruding chin bone often need procumbent incisors to produce a pleasing profile. We certainly cannot hope to give all patients what we term an ideal profile, and if we did we could not prevent it from returning to its individual normal. That individual normal may seem to us to be an abnormality but, as Dr. Fairbank states, that axial inclination may be the result of some normal or abnormal force over which we have no control. Its correction to what we believe to be normal may therefore be an unstable result for our treatment may not correct the force which originally caused this condition. I do not believe we can claim that oral health is the fundamental reason for the advisability of correcting a procumbent tendency, for we have seen many adults with incisal procumbency whose oral conditions were apparently normal. Esthetics seems to be the primary factor, but that too is not an issue in many of these cases.

Dr. Fairbank emphasizes, and I think he has hit the nail right on the head, when he says, "Our successful cases are those in which the teeth are placed in such positions that

the axial inclinations of the teeth and the forces of occlusion are in *balance* whether we know it or not.'' If our cases are successful the whole set-up must be in balance, and even if it looks wrong to us it must be in balance if the end result is stable.

Dr. Fairbank states that one's idealism may be antiquated, from a period of twenty-five years ago. How true that may be and how readily we must be willing to open our eyes to scientific developments which have proved to us the causes of our failures, if we recognize these causes we should then unquestionably realize the necessity for a change in our treatment planning and therapy. It used to be common practice to expand greatly all arches. Now we know better and expand very little, for we know why expansion is futile; consequently, if we have been willing to progress with the times we have changed our concept of orthodontic therapy in these cases. We now realize from scientific findings the wisdom involved when Dr. John Mershon emphasized years ago and Dr. Fairbank has again brought to our attention that orthodontic treatment does *not* stimulate or produce bone growth. Growth is an inherent factor in an individual, over which we have no control. Heredity is also an uncontrollable factor of great influence in our specialty. Dr. A. LeRoy Johnson has shown that it is possible for the same individual to inherit large teeth and small jawbones. Then how can we possibly dispute the fact that it may be essential in some cases to remove some dental units to give an efficient and a stable orthodontic result? And yet we have orthodontists who still feel that it is wrong to follow such a procedure. Unfortunately we have not all changed our therapy, even in the face of scientifically proved changes in concepts of etiology and prognosis. Dr. Stanton years ago showed by his charts that there were hereditary individual abnormalities in tooth sizes. The upper teeth may be too large to fit properly with the lower teeth, and vice versa. I have had cases where it was necessary to remove a lower anterior tooth to give a better occlusion with the upper teeth. We frequently have cases of lower premolars being too large to fit with the upper teeth. The correction of these cases may not be just what we would prefer, but they are beyond our control and should we therefore class these results as failures or unexplainable abnormalities? Failures due to our own faulty therapy and treatment planning, however, must not be alibied by imaginary abnormalities or third molar pressures as has frequently been done.

Dr. Fairbank mentions that treatment is often prolonged because we were attempting to stimulate growth, which we now know is impossible. It has been this long orthodontic treatment that has discouraged many patients and, more than that, it is this long treatment that has frequently prevented the production of good results. In extended treatment the child often gets very tired of treatment long before it is completed. A new patient is usually cooperative in wearing elastics, keeping appointments, muscle therapy, etc., but after he has been treated three or four years it is an old story, and cooperation is lacking at the time when we are completing the case, the very time when we need it most. I fully agree with Dr. Fairbank that we should treat them and get it over with as soon as possible within the limits of normal growth. I have made it a definite plan in my practice to avoid all treatment until the permanent teeth are in place, with the exception of cross-bites, mesioclusions, and cases of great facial deformity. These are treated early, but all others wait until such time as we can carry a case through to the end, without the intermittent rest periods waiting for loss of deciduous teeth and facial growth, for growth will take place in spite of us and does not need treatment to stimulate it.

I must not take more of your time in this discussion. I have greatly enjoyed Dr. Fairbank's paper and I have been very happy to have been asked to discuss it. It is such papers as these that keep us on firm foundation.

This discussion has again given me the opportunity to express some of my inward feelings on therapy and the general trend of orthodontic progress—a progress due to the unselfish efforts of our many careful scientists and our splendid technical clinicians and teachers.

If we can all be honest with ourselves, carefully considering new thoughts as they appear in our profession, weighing them carefully, using them when feasible, but at the

same time keeping our feet firmly on the ground, our specialty will gain in the estimation of the public and the entire dental profession.

Far too much stress has been laid on the importance of mechanics in orthodontics, while the major concern of a successful orthodontist should be full knowledge and adherence to the biologic principles of growth and heredity and a deep respect for the physiologic and morphologic influential factors which have to do with the development of the individual from babyhood to adulthood. When we can fully realize that there is a very definite relation between dental growth and general growth, when we can realize that the development of the dental arch is limited by the over-all bodily growth, when we can visualize the definite relation of the size of a dental arch in its relation to supporting alveolar and basal bone structures, when we can realize that our scope of orthodontic successes is definitely limited by the inherent influences of nature and its intricate uncontrollable influential factors and by the inherited individual postnatal growth pattern, we should then also realize that we are still but in our infancy as far as having a complete knowledge of orthodontics from a scientific standpoint, and we will then and then only be able to count ourselves as being worthy of having a small part in this great unlimited field for health service.

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ORTHODONTIC EDUCATION WITHIN THE SCHEME OF DENTAL EDUCATION

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I HAVE read with a great deal of interest the Report of the Committee on Education to the Board of Directors, American Association of Orthodontists, by Dr. George M. Anderson, Dr. Walter T. McFall, and Dr. Leuman M. Waugh, Chairman, published in the AMERICAN JOURNAL OF ORTHODONTICS, June, 1948. A careful study of its contents reveals that it reflects the confusion existing not only in the proper understanding of the relationship between the specialty of orthodontics and its parent profession, dentistry, but also in the field of orthodontics itself. A clarification of that confusion is very much indicated today.

The history of the specialty of orthodontics is replete with examples of that misunderstanding, and we are no nearer an improvement of the situation than we were in the early days of Angle. We may have accumulated more knowledge and greater experience and progressed in laying a scientific foundation for the specialty of orthodontics, but we are still confused as to the principles of practice and the policy of teaching both as a specialty and as a necessary integral part of the profession of dentistry.

Yet progress has been made. Proprietary schools with their short courses have been exposed for their inadequacies, and their organization has been so discouraged that they hardly exist today. Recognized dental schools have inaugurated longer courses in the specialty; serious attempts have been made to improve the quality of education, but the confusion today is greater than ever. Some quotations from the above-mentioned report definitely prove this point.

> At a conference of the Dental Education Council held in Chicago in February, 1948, we are reliably informed by officers of our Association who were in attendance that we were accused of having been unwilling through the years to help solve the problem of orthodontic education, especially for the undergraduate. We must here go on record.
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> It has been our good fortune to have been a member of the American Association of Dental Schools and its predecessors from 1900 to 1945. We attended nearly all its meetings. For quite a number of years we served on its committee on education, taking our turn as chairman, and we here desire to assert that during all of these years teacher members of our Association repeatedly offered outlines of courses for the undergraduate, graduate, postgraduate, and advocated advanced instruction for orthodontists under University Extension. These reports were published regularly in the annual proceedings of the American Association of Dental Schools and in the *Journal of Dental Education*. The unvarying result of these efforts through all these years was, in general, one of merely passive interest on the part of the teachers in the other branches of dentistry, especially the clinical divisions. Lack of time has been the principal excuse but, in our humble opinion, lack of understanding of the orthodontic problem and unwillingness on the part of clinic teachers to cooperate in providing sufficient time for a thoroughgoing orthodontic clinic and their persistent desire for more time for their own work were the real causes behind that. It was impossible to convince the body of the essential importance of adequate clinical training. We insist that it is just as necessary to give thorough clinical training for orthodontic practice as it is for operative dentistry, prosthetics, or any of the other clinical branches of dentistry.

The Secretary of the American Association of Dental Schools was asked if a conference for joint discussion might be arranged. He wrote to us in part as follows:

> The Association does not have a Committee on Education. It does have, however, a Committee on Teaching which might serve the purpose which you have in mind. Lloyd E. Blauch, Ph.D., Senior Specialist in Higher Education, U. S. Office of Education, Federal Security Agency, Washington 25, D. C. is Chairman of this Committee and I might say that he is perennially its chairman for I have no doubt the Association will re-elect him to that position just as long as he will accept the responsibility.
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> Something peculiar has happened among the orthodontic teachers. Two years ago the conference group on orthodontia was asked to prepare a program for the 1946 Meeting, but failed to do so. They were again consulted for 1947 and again there were no results. As a consequence there is not now in the Association and, unfortunately so, a committee or a conference group which is concerned with orthodontia. I am sure that Dr. Blauch has made repeated efforts to have this group become active, but apparently he has not been overly successful in his efforts. I would suggest that it might be well for you to write a letter to Dr. Blauch, for I am sure he could be of considerable help to you.

We could go on and find many other instances in the literature to demonstrate this widespread confusion; but before any progress can be made, we must really understand the crux of the problem of orthodontic education. The general practitioner of dentistry has many false impressions of the specialty of orthodontics. Having had very little instruction and training during his undergraduate career, he is helpless in his decisions and evaluations, and becomes gullible to misstatements, distortions, and exaggerated claims from different directions. This situation hurts the profession of dentistry as a whole, as well as the specialty and the public. While the short courses offered by the proprietary schools of the past were the only means of education for specialization, the realization of their inadequacy soon became apparent. This made it necessary for the graduates of these courses to band together into orthodontic groups and societies where the education of the student was continued and rounded out. In this way, like in other professions and specialties, the present science of orthodontics was developed. There was and still is a hunger for knowledge on the part of all their members. Meetings are well attended and distances to these meetings present no barrier. The more we delved into the problem the more we realized how little we actually knew and how much more we had to learn. We became more hesitant in our claims and statements and more cautious in our techniques and procedures. To the general practitioner of dentistry and the novice who developed an interest in orthodontics, this reserve became a puzzle.

The impression was created and the opinion is still held by many that the orthodontist keeps himself aloof from the general practitioner; that, having gotten in on a good thing, he tries to keep it to himself and deliberately makes it difficult for an outsider to share in that lucrative field. The general practitioner mistakes hesitancy, doubt, and a sincere effort to point out to the novice the difficulties and uncertainties of orthodontics for a selfish and deliberate attempt to withhold knowledge. This mistaken idea makes the general

practitioner gullible to quack educators and sincere incompetents with some knowledge, a lack of principles, and very little real experience. The frequent statements that the practice of orthodontics is easy, a lucrative field, and should be incorporated into the general practice of dentistry may be made in all sincerity; but at best they show a lack of understanding of the real problems of orthodontics. Very often they are traps, perhaps unintentionally created, for gullible dentists to part with their money for short, inadequate courses by unrecognized individuals who lack a real understanding of the problem themselves and have neither the physical equipment, clinical training, nor scholastic background to give proper instruction or guidance.

This misunderstanding exists not only among the general practitioners of dentistry, but also among the leaders and educators of our profession. It is the main reason for the difficulties experienced by the Committee on Education as expressed in their report mentioned previously. We must recognize this situation as such; but we should realize that it is a natural sequence of events and a stage in the development and progress of our specialty of orthodontics. How to face this situation and how to attack this problem are of paramount importance today.

Differences of opinion and various schools of thought exist in any science, philosophy, or profession. They are necessary incentives to progress and reveal a healthy sign of growth, but they become dangerous if not clearly defined and properly organized. Some inconsistencies may always creep in, but a real science progresses in direct proportion to the reduction of these inconsistencies. We can be proud of the progress made by the science of orthodontics, but we must be able to recognize the pseudoscience from the real. Pseudoscience does exist in orthodontics to a great extent and is the stumbling block to the progress of a noble and humanitarian profession which shows a great promise for the future.

There are many important issues in the science and practice of orthodontics about which diametrically opposite claims are made and beliefs are held. These differences are so acute at times that they very often become a prey to emotional outbursts which lead nowhere and create a dangerous confusion. Our varied experiences and accumulated records, if properly analyzed and objectively studied and presented, could form the proving grounds for the various claims, theories, and hypotheses. We have now grown into a healthy and robust young adult, and should be able to face facts no matter how much it conflicts with our pet theories and personal interests. We should be able to differ amicably, calmly, and genuinely with each other and be willing to admit our own limitations of knowledge and our own inabilities to interpret properly accumulated observations and records.

On Understanding Science is the title of a book written by James Bryant Conant. It should be read by all members of the orthodontic profession interested in the science and research of our specialty. It will help surmount the difficulties met with in the development of the science of orthodontics. We will be better able to approach our problems objectively, a qualification so necessary for their adequate solution.

The accumulated observations, records, and experiences of the last forty years, as revealed by our literature, form an abundant supply of material for objective study and analysis. The interpretation of this material, as made by the different authors, reveals the usual discrepancies, inconsistencies, and exaggerations manifested by a young growing science and is to be expected; nevertheless, it is the reason for our present confusion. Let us discuss some of these conflicting views and theories.

The subject of preventive orthodontics as presented in our literature is replete with discrepancies and inconsistencies. Exaggerated claims are made by some that from 70 to 90 per cent of malocclusions could be prevented if seen early. What these preventive measures are, I do not know, but the most important one amongst them is the practice of inserting a space maintainer when deciduous teeth are lost prematurely. Yet the literature is full of records showing that many dentitions which have lost deciduous teeth very early have developed properly if left alone. No attempt will be made to argue the merits of the two divergent views, but it is important to note that these divergent views exist in the minds of leading orthodontists. How confusing this must be to the general practitioners and dentists who depend on the specialist for guidance! How can the dental educators come to an agreement with the orthodontic educators when such discrepancy exists in a simple subject so important to the dental profession and the orthodontist?

The optimum age to start orthodontic treatment is another extremely controversial question within our specialty. The importance of this knowledge to the undergraduate student and the dentist cannot be exaggerated, yet the leaders of our specialty are themselves vastly apart in their understanding and approach to the problem. The question of technique and appliances divides us so much that it is confusing not only to the general practitioner and the undergraduate student in dentistry but also to the student of orthodontics and the practicing orthodontist.

To this all befuddled situation let us add the question of extraction in orthodontic therapy, and we have a picture of real despair. Can any general plan of orthodontic education be properly developed in such an atmosphere? One has only to read and study the different textbooks of orthodontics and he will have ample proof to support this contention. This statement is made with all sincerity and a realization of possible misunderstanding, yet there is no intention to create the impression of hopelessness and skepticism. This situation should be accepted as a healthy sign of progress and is to be welcomed. A situation which is so definitely wrong must bring some good. When there is chaos calm must follow. By the process of trial and error a science develops. If we pursue an experiment diligently, even if the procedure is entirely wrong, we will sooner or later learn that we are wrong, and somehow will be led in the right direction by a process of elimination. We are now ready to learn, and for the first time there are signposts leading in the right direction. We have only to recognize them and our path will be made much easier.

Orthodontics is a biologic science and as such is considerably limited in its exactness. It is an applied science and has all the weaknesses which go with that classification; nevertheless it differs considerably from most of the other biologic sciences. We are involved in all the intricacies of physical growth and development, with the concomitant influence of phylogeny, ontogeny, physiology, heredity, and environment, but we are dealing with an exposed and concrete manifestation of biology. Unlike the surgeon and the internist we cannot bury our mistakes. The product of growth and development is the completed dentition. It can be recorded exactly in the form of casts, photographs, and measurements. We may not be able to solve the problems of etiology of malocclusion, but the products of nature's handicrafts and mistakes and our own handicrafts and mistakes are ever present to stare us in the face. It takes no skilled or trained mind to recognize buck teeth, crowded teeth, undershot jaws, or chinless profiles. To explain and understand the reasons and the bases for these manifestations are extremely absorbing studies of orthodontic science, and though our problems may be very complicated and involved, we at least have the advantage of working with a concrete, visible object of nature to be studied and manipulated for esthetic, healthful, and functional purposes.

These facts are emphasized in order to demonstrate the reasons for the existing confusion in orthodontic education. It is not the purpose of this paper to delve into the many ramifications of our different problems, but it is hoped that enough interest will be aroused to enable us to recognize these problems, admit them, and face them objectively and courageously. How best to do that and how to organize our educational system for that purpose are very important, but before we can do that we must understand and agree upon the proper relationship of the science and art of orthodontics to the parent profession of dentistry and dental science as a whole.

All through the history of dentistry it has been said that our profession of dentistry really is a special branch of medical science. Cooperation between dentistry and medicine has been preached and desired, and lack of such cooperation has been greatly deplored. The actual practice of dentistry presents many characteristic problems which have made it difficult to decide the best way to get this cooperation. There are those who believe in absolute autonomy and there are those who feel that the only way to improve the relationship between dentistry and medicine is to integrate dentistry completely with the school of medicine under the leadership and control of the medical department, not necessarily as a dominated part of this department but as an equal partner in the general scheme of medical education. Which plan is better is open to considerable discussion and differences, but we must decide whether we want autonomy with some cooperation, cooperation with complete control by medicine and no autonomy, or cooperation and equality with some degree of autonomy under the supervision of medicine. There are advantages and disadvantages in all of these plans which should be analyzed and discussed. The purpose of presenting this subject at present is to demonstrate how the problems of orthodontic education with relation to dental edu-

cation are no different from those of dental education with relation to medical education and also of the different specialties of medicine with relation to the parent profession of medicine in their plan of education and their individual sciences. We may differ a great deal about the methods of administration of dental education with the medical educators, but we cannot deny that we can learn a great deal from them in the solution of the problem of orthodontic education in our own profession.

If it is admitted that there is a great relationship between dentistry and medicine and that cooperation and understanding between the two professions are to be desired, how much more is that true of orthodontics in its relation to dentistry and dental science. Orthodontics is as much a part of dentistry as obstetrics, gynecology, otolaryngology, and all of the other closely linked specialties of medicine are of the medical profession. The teaching and training of the medical student consists of a broad, intensive program of education in all of these specialties. The sciences of these specialties are well organized, and the clinical departments are deliberately arranged to function for the purpose of training the medical student not particularly as a specialist but as a well-rounded physician. The student may decide to specialize ultimately, but he is first given a broad knowledge of medicine, with an opportunity to observe and study the operation of any or all of the different departments and specialties. In this way he becomes generally conversant and is well equipped to weigh and judge the different theories, views, and techniques of any specialty. His training primarily equips him to become a good general practitioner and enables him to advise and guide his patients properly in the need for and choice of a specialist. Differences of opinions, theories, and techniques can always exist in orthodontics, but they must be clear-cut and exposed to an enlightened jury of a well-educated dental profession. This puts the specialist on his mettle and avoids confusion, which is a stumbling block to progress and very dangerous to society as a whole.

Orthodontic science today is rich with accumulated records, technical experiences, and clinical evidence, but it is very much disorganized. Our textbooks in some instances may be good records of different viewpoints and in other instances good encyclopedias, but they fall short of the qualities that go to make up a real science. There must be fewer discrepancies and inconsistencies and more clarity in the division of opinions. A careful study of the literature reveals unnecessarily created controversies and more hidden agreement than appears on the surface. Very often there is a greater lack of understanding of the topic under discussion than there really is a difference of opinion. Two schools of thought may bitterly argue divergent viewpoints, but on analysis it will be found that they do not mean the same thing at all. "They do not speak the same language." A proper application of semantics may frequently dissolve some sharp differences and vexing problems. An authentic terminology is the basis of any science. It does not yet exist in orthodontics, although earnest attempts in that direction have been made in the past. Its creation is the combined responsibility of the dental profession and the orthodontic specialty with their individual societies and educators.

A well-represented committee consisting of exponents of the different schools of thought within the specialty, as well as dentistry as a whole, and experts in semantics should function continuously in our organizations and profession and should be properly represented in every university. It would serve a varied purpose and would contribute most to the elimination of the confusion which is seriously affecting our specialty.

A timely paper was published in the AMERICAN JOURNAL OF ORTHODONTICS AND ORAL SURGERY, September, 1947 (vol. 33, no. 9), written by J. Wunderly, D.D.Sc., D. Sc., and J. F. Richardson, M.Sc., of Melbourne, Australia, entitled "The Need for Reform in Academic Orthodontics." It is the report of a study made of the available textbooks of orthodontics and their relation to the problems of orthodontic education in Australia. The paper poses some important problems and is a serious attempt to analyze them, but in so doing also reveals some misconceptions and discrepancies which may be dissolved by objective study and a proper application of semantics. The summary of this paper will be quoted here:

1. Inquiry has been made into the teaching of orthodontics in Australia and also into the prescribed textbooks.

2. It has been found that a considerable part of the theory which is being taught is unscientific, and it is inconsistent with that of physics, physiology, and pathology.

3. Various improvements in the teaching of the theory of orthodontics have been submitted.

4. Ambiguous and otherwise inappropriate terms are generally used which are not clearly defined. More suitable terms have been recommended.

5. Suggestions have been made for the clarification of the general view of normal dental occlusion, and of dental malocclusion, and also for the improvement of the standard classification of cases of dental malocclusion.

6. In Australian dental schools, the teaching of the immediate background of orthodontics is adequate, but there is absence of the subjects of the remote background from the syllabus.

7. The textbooks on orthodontics, in general, exhibit the obvious need for the condensation and the logical arrangement of the text.

No attempt will be made to enter into a lengthy discussion of these various points, but it must be indicated that they lend themselves to sharp differences of opinion which should be studied objectively by a well-represented and capable group of our profession.

CONCLUSION

1. Although considerable progress in orthodontic education has been made, it is still in a state of confusion as great, or greater than in the early days of Angle.

2. During the last forty years there have been accumulated valuable records, clinical materials, and technical experiences to enhance the science of orthodontics, but this material lacks proper organization and objective interpretation.

3. The confusion in orthodontic education is due to the confusion in orthodontic literature and the disorganization and improper interpretation of our scientific material.

4. Orthodontic science is part of dental science and should be included in the undergraduate study and training of the dental student to the same degree as such specialties as obstetrics, gynecology, and otolaryngology are included in the undergraduate study and training of the medical student.

5. A well-organized department of orthodontics should function in every dental school.

6. All the basic and correlated subjects of orthodontic science should be taught to the dental student to the same degree as the different sciences and subjects of the different specialties of medical science are taught to the medical student, with the main object in view to train the student to become a well-rounded general practitioner.

7. The evolution and development of the dentition, the problems of dental occlusion, normal occlusion, dental malocclusion, facial growth, and facial patterns are important subjects to the dentist as well as the orthodontist, and should be included in the undergraduate program of dental education.

8. It should be obligatory for the dental student to spend some time in the orthodontic clinic, only in the capacity of an observer and assistant, to learn the problems, difficulties, and limitations of clinical orthodontics, as well as the possibilities. The orthodontic department should function in a manner similar to the surgery department or any other specialty in the setup of the medical school.

9. The proper training of a specialist in orthodontics takes many years and is no different from the training of any specialist in the medical profession. Postgraduate and graduate education of the specialist should be available in every dental school and should be planned with the understanding that this education is only the basis for further education and special training in orthodontics.

10. Technical education and clinical training should be given only in the postgraduate and graduate programs, preferably to dental graduates who have had some experience in general practice. These postgraduate and graduate students should form the clinicians of the orthodontic department of every dental school.

11. Short intensive courses of appliance construction and techniques should be discouraged. They are inadequate and misleading. Instruction in the construction and insertion of the best appliance does not teach or show the merits of the individual technique or appliance of the instructor. To learn properly the use of the particular appliance or technique, its clinical application under expert supervision for a period of at least two years is necessary.

12. Periodic seminars and clinical demonstrations of patients under treatment should be arranged frequently for the purpose of more advanced study by experienced practitioners.

13. A committee on terminology of orthodontics should function in the American Association of Orthodontists. It should consist of representatives of every school of thought of our science and an expert in semantics.

14. This committee should be represented in every dental school and every university.

15. Progress in orthodontic education will reflect on the progress of orthodontic, dental, and medical sciences, and will benefit society. The orthodontic profession must organize to institute that progress and should do that without any regard for pet theories or personal advantages.

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57 WEST 57TH STREET.

PRINCIPLE OF THE VARIATION FACTORS AND THEIR INFLUENCE UPON THE SOMATIC DEVIATIONS

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THIS last period of time, which seemed for the orthodoncy apparently inactive due to lack of novelty, is characterized by a process of reflections from which many questions have reappeared clearer, many ideas stronger. A transformation of thought is evident, which discloses the need for those who profess this science to pass from analysis to synthesis, from the particular to the general, and to attribute to their own intellect a strong faculty of intervening in the solutions of problems regarding them.

Recognizable in every field, this transformation brings in the diagnosis the predominance of the induction over the too simple interplay of measures, and in the therapy a greater valuation of the obtainable results. In the etiology it makes the natural factors more acceptable, taking more into consideration the hereditary phenomena and, particularly, that influence caused by individual somatic variations.

ACTUAL STATE OF THE KNOWLEDGE ABOUT THE ETIOLOGY AND PATHOGENY OF THE DISGNACIES

The question about the etiology and pathogeny of the deviations of the teeth, jawbones, and face is still open because appearance can be considered known and sustainable only of some of these anomalies—those in which a pathologic origin is supported by actual elements (endocrinopathy, rachitis, and respiratory obstructions), or those in which a mechanic-traumatic origin is supported by known and encountered facts (macroglossia, lower insertion of the frenum, temporomandibular ankylosis, precocious extraction of teeth, and bad habits). Moreover, it can be considered known in the disgnacies, due to a recent physiologic inheritance and, precisely, to the crossing between the big teeth of one of the parents and the little jaw teeth of the other parent, or also to a contrary situation that is the cause of an abnormal relationship of volumes between these two organs and the determinative types of disgnacies, because of the fact that the teeth, not finding sufficient space for their alignment, are forced to grow irregularly, or also, finding too much of it, remain separated from each other by diastemas.

There are many other disgnacies (of which the previously mentioned actual elements, which give value to the mentioned pathologic or traumatic origins, are not demonstrable) of which the causes that provoke the dissociation between the growth of the bones and the dental evolution are not known, nor are signs to be found in near relatives that testify the form of recent inheritance mentioned. Efforts are made to explain with them the cause of occurrence, on one hand attributing it to pathologic circumstances, hygienic or traumatic, and on the other

attributing it to the old physiologic inheritance, upon the base of the phylogenetic theories (atavism, regression).

It is not our intention to treat inexhaustible subject, but, as conclusions are necessary for our work, as introductory note, we shall limit ourselves to the following observations:

1. Suppositions about the positive elements, like the pathologic or traumatic factors, are not sufficient to clear up the origin of the disgnacies, in which said factors do not actually appear; therefore, the origin remains confused and uncertain.

2. If recent physiologic inheritance exists, also the existence of an old one cannot be excluded. But what is the relation between the two? Excepting the aforementioned crossing, there is no other hereditary disgnacy with which could be explained the reason of occurrence, unless going over the different phylogenetic theories which lead us to hypothetic interpretations of the transmission of characters. That is why also the reference to the old physiologic inheritance leaves in its turn the etiology of the disgnacies confused and uncertain.

THE SOMATIC VARIATION FACTORS

Sometimes research of causes in too remote and complex factors paralyzes the intellect, abolishes the spontaneity of the consideration of facts, and hinders the observation of things that are closer. We believe to be able to explain the origin of one part of the disgnacies, bringing the observation to a simple fact, to a general peculiarity of man, which is represented by the *somatic, individual variation*.

In order to obtain this aim, it is necessary first of all to admit that certain somatic characters can exist independently, as well as from pathologic factors (even if a derivation of physiologic inheritance, through the medium of examining the relatives, is not found), also from regressive and atavic phenomena, an admission not difficult when one takes into consideration the following.

Remounting the genealogic tree of a certain individual, one finds that in its formation a great number of ancestors have contributed, and, moreover, after a certain number of generations the quantity of the characters transmitted by these ancestors is extraordinarily great. These characters, each of them being able to represent itself, mix and alternate, because of their great number, so much that they create in the individuals an incessant transformation, which makes that in every organ exist particular, evolvent tendencies, particularly distinguishable in:

a. Morphologic tendencies, due to which the development of an organ, or of a part of it, in one direction predominates the development in another direction.

b. Volumetric tendencies, due to which the growth of an organ, or of a part of it, is excessive or deficient in relation to the growth of near organs.

c. Tendencies to particular conformation of the whole, dependent on the static-dynamic adoption of the organs of an apparatus, subdued or not subdued to the said tendencies. These particular evolvent tendencies create somatic, differentiated characters which can be of small entity, contributing to the general distinction of the individuals, but also being of noticeable entity, putting them-

selves well in evidence, or also compromising the morphologic-esthetic equilibrium of the characters and assuming in this way an active role. It is clear that the new characters are somatic variations not found in relatives and which, however, have in origin endogen and not exogen from the pathologic or traumatic factors; and it is also clear that they reflect an inheritance which must not be indispensably leagued with atavic or regressive phenomena, although the latter cannot be denied.

The evolvent tendencies mentioned are capable of creating the active characters of somatic differentiations which we call "somatic variation factors," or, more briefly, "variation factors."

The Influence of the Somatic Variations Upon the Etiology of the Disgnacies.—

The variation factors are of great importance for the face because variations, unnoticed in other parts of the body, assume here an aspect of dysmorphosis because of esthetic exigency, and are of particular importance in the region of the jawbones, which occupy the greatest part of the face. This dysmorphosis can explain the origin of many deviations of the teeth, jawbones, and face, as we shall try now to bring into evidence, examining some of them with the system of the three-dimensional analysis.

Fig. 1.

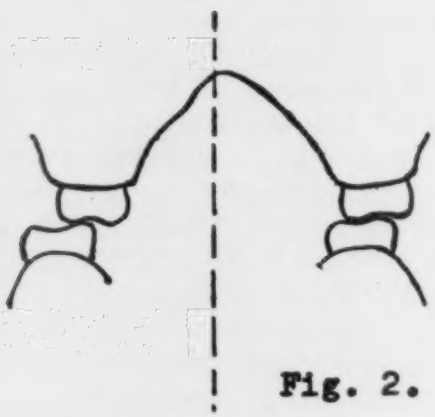

Fig. 2.

1. *Action of the Variation Factors in Horizontal Direction.*—Generally considered, the variation factors prepare in the horizontal directions a ground not fit for regular alignment of the teeth. The latter, in fact, owing to their definite number and dimensions, in order to grow regularly, require a well-determined quantity of space and a conformation in the base of the bone, corresponding to that of a dental arch, which corresponds to the requisites generally considered normal. If a somatic variation affects the jawbones, happens that this relationship remains altered, and the teeth, which have an embryonal different origin

and are not forced to follow an evolution parallel to that of the jawbones, detached from one another, free and extremely mobile, come out of the regular curve and arrange themselves, more or less disordinately, transforming in this way the variation of the bone in deviation of the teeth.

2. *Action of the Variation Factors in Horizontal-Transverse Directions.*—The variation factors can be examined particularly in the transverse and anteroposterior directions. We find a clear example of the influence of the variation factors in transverse directions in the tendencies of the two halves of the face to assume a different volume, owing to which the face becomes asymmetric, and its organs arrange themselves in curves, hollow in the part of less volume (Figs. 1 and 2). Following the course of these curves, the upper jawbone, which is in correspondence with the maximum of the depression, is pushed outward, both dragging with them the teeth and provoking an asymmetric deviation of the arches. But it may happen that the variation, while determining the new morphology of the skeleton's conformation, is the reason that these anatomic-topographic relations of antagonism between the jawbones that assure the normal interlocking between the dental cusps are not preserved. The teeth, therefore, invert their relation of transverse junction; the cusps of the upper teeth place themselves in the intercuspal furrows of the lower teeth, provoking that disgnacy, known as "*Mordex incrociatus.*"

3. *Action of the Variation Factors in Horizontal, Anteroposterior Directions.*—Not less clear are the examples of the action of the variation factors in horizontal, anteroposterior directions, offered by the tendencies of the jawbones to develop, projecting themselves too far forward, or remaining too far backward, both together or dissociated, on which depend the two principal orthodontic complexes, summarily distinguishable according to the convex or hollow aspect which the face profile assumes.

A. *Orthodontic complexes in which the outline of the profile tends to convexity:* The one, characterized by the curve-line profile, is typical (Fig. 3) when forehead, radix nasi, and base of the nose project, while the lower lip and the chin recede, all of them along a curve of an anterior convexity. In this convexity the dental arches can maintain normal relation of anteroposterior or mesiodistal junction, owing to a mechanism of adaptation, in which the inclination of the front lower teeth participates. But if the variation is of considerable entity, the mechanism of adaptation is no more able to compensate the opposed deviation of the jawbones and the dental arches, which are subject in the upper part to recede, losing the relation mentioned, that is, the upper lateral teeth grow in front of the lower ones instead of vice versa.

In this case of esthetically arrhythmic profile, but in which all parts of the face have found a reciprocal morphologic adaptation, the influence of the variation factors is an absolute evidence, no other cause being even hypothetically acceptable. The factor, represented apparently by two tendencies, one of which causes the projecting of the upper jawbone and the other the receding of the mandible, but in reality represented by only one somatic tendency, destined to push forward the middle part of the face so that it appears convex, and which is subject to a very complicated biologic mechanism where dynamic action of

chewing and respiratory function and the combination of the type of facial profile and somatic variation are important.

If one thinks how much affinity exists between the curve-line profile and the angular profile (in which the organs of the face are arranged, rather than in a curved line, in two lines, which meet at an angle, smaller or larger according to the upper lip, but characterized equally by the projecting of the middle part of the face) (Fig. 4), one can understand that the inversion for junction of the lateral teeth can depend, as in the type of the curve-line profile, on variation factors which stimulate the upper maxilla to project, leaving the lower one backwards. This fact admitted, it can also be understood how great is the probability of an intervention of variation factors in every type of anteroposterior deviation.

Due to this constatation, the variation factor has to be taken into consideration every time when the tendency of projection of the middle part of the face enters into the play, a well-determined circumstance in continued, principal types of orthodontic complexes.

A first one is noticeable because the nearly straight line formed by the forehead and the chin is interrupted, or broken, by the projecting of the lip region, while the dental arches keep a normal mesiodistal relation of junction (Fig. 5). This case is not only subject to the same evolvent tendencies of the precedent, which solicit the projection of the middle part of the face, but also to the same biologic mechanism of formation, in which, perhaps, is to be taken into consideration the junction of the discussed variation factors with the characters of a straight-line profile (forehead and chin arranged in one straight line). According to the principal somatic peculiarity constituted by the projecting, localized, as well as in the upper lip, also in the lower one, we have called this complex "*prosopoectasy bimaxillar,*" which can be *anterior,* if it affects only the frontal teeth, and *total,* if it extends over the lateral ones.

The other complex is the one in which the region of the nose's base and the upper lip is prominent, and that of the lower lip and chin set backwards (Fig. 6), while the molar teeth are in normal relation of anteroposterior antagonism, if the variation factor is localized anteriorly, and, on the contrary, if the variation factor has affected the maxillae in their integrity, the molar teeth are in inverted, anteroposterior relation as the precedent is subject to the same evolvent tendencies and the same biologic mechanism of formation. For its peculiarities we have called this disgnacy "*prosopoectasy*" (upper projecting and lower receding), which can be, as has been explained previously, *anterior* if it regards only the frontal teeth and *total* if it is extended over the lateral ones.

B. *Orthodontic complexes, in which the outline of the facial profile tends to concavity:*

The variation factor is opposed to the precedent and is constituted by tendencies of the lower jawbone to project itself and of the upper jawbone to remain backwards (Fig. 7), being subject to a complicated biologic mechanism and to a difficult explanation, in which the combinations of the somatic variations with the straight-line profile, on one hand, and with the function on the other hand, have to play an important role. The difference in the development need not be noticeable in order to determine a dental deviation. It is enough that

the difference can dispose of the antagonist incisors in a way that the upper ones can come into contact with the lower ones in the point of the vestibular part of their triturating margin, instead of at the tongue's region (primary deviation). The sliding toward the inverted occlusion, while little by little the teeth grow, is one of the most simple cases, because it depends only on a mechanic fact (secondary deviation). The vaulted development of the profile's line has suggested to us to call this complex "*Prosopoentasy.*"

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

Of course, the question can deal, although exceptionally, a single variation factor, which consists of the tendency of the upper maxilla to remain backward, or of the tendency of the mandible to develop too far forward, almost obtaining the precedently delineated issue.

C. *Orthodontic complexes in which the facial profile is eurythmic:* Here the variation factor is enclosed in the region of the molar teeth and makes the teeth set too far forward, while in the anterior region of the face exists such static-dynamic conditions as to neutralize this pushing. There can be two types of this complex. We have called the first *"upper prometasthodontic sintostasy"* (Fig. 8) because of the three symptoms of which it consists: (1) dental pressing together (σύνθεσις—regrouping); (2) eurythmic face profile, hence localization in the skeleton (οστα—skeleton); (3) displacement forward of the upper molar teeth (pro-forward; metasto-placement; dentico—dental) and from which the inversion of mesiodistal junction of the molar teeth derives.

The second complex is called: *"sintostasy prometasthodontic bimaxillar"* (Fig. 9), because of the three symptoms: (1) dental pressing together, upper as well as lower; (2) eurythmic face profile and hence localization in the skeleton; (3) a position too anterior both of the lower and the upper molar teeth, from which their normal mesiodistal relation of union derives.

Vertical Variation Factors.—The examples of action of the variation factors in vertical directions are demonstrative. They can manifest themselves in the form of a tendency of the jawbones, anterior or posterior part, to develop and to maintain themselves too high or too low (Figs. 10 and 11) in relation to the oral rhyme which, on the contrary, retains on the face profile regular relationship of height. The teeth, following the bone base, are also forced to modify their relation to the oral rhyme, disappearing under the upper lip, or protruding excessively. The same variation factors can also affect the face. In this case the oral rhyme assumes a very high or low position, together with the bone-dental apparatus. Very interesting is the tendency of the frontal regions of the jawbones to attract each other, the lower one projecting the teeth against the palate, the upper one pushing them downward, as far as the gum's membrane, constituting the orthodontic complex called *"Mordex profundus"* (Fig. 12).

The Factor of Somatic Variation, Associated With the Pathologic Factor.—The variation factor, in order to represent a particular somatic, individual tendency, inherited from the combination of numerous ancestral characteristics, is an endogen variation factor of physiologic character and cannot have a pathologic interpretation. It must not be believed that, sustaining its influence, we want to dismiss the pathologic factor of the etiology from cases similar to the ones mentioned, in which its action is demonstrable. On the contrary, we think that the two factors are not incompatible and that in certain cases the factor of somatic variation, although remaining the principal agent of the determination of the deviation, associates itself with the pathologic factor, which has the function of stimulating and heightening the individual somatic tendencies. Under this stimulus the factor of variation can act directly or indirectly.

A. *Direct action of the disease upon the variation factor:* When a disease alters the development of the bone, it acts directly upon the active variation factor, as upon a predisposed ground, in order to stimulate it. Here missing the equilibrium of evolution, due to the protuberance caused by the disease, especially in the period of ossification of the maxillae, while all other characters are

static and in disorder, this one, subject to the active variation factor represented by the somatic variation, destined to make it emerge, keeps its efficacy and does not continue only its march of development, but also remains intensified in its physical manifestations. Let us take as an example an individual who has a

Fig. 7.

Fig. 8.

Fig. 9.

Fig. 10.

Fig. 11.

straight face and an angular profile, affected by a disease such as syphilis, capable of acting upon the somatic evolution of the maxillae, hindering their different parts to grow proportionately dependent on each other, but favoring a disorder of the volumes, as well as of the form. The tendency toward protuberance of the middle part of the face does not remain weakened by these circumstances

because, sustained by an evolvent, permanently active energy, much more free of prohibitory restraints which should prevent them from having internal equilibrium of development and which, on the contrary, are not to be found here, the prominence of the nose, and the upper lip increases, the intermaxilla and the teeth are projected forward and the variation is transformed into deviation, that is, into anomaly.

This principle of the action-direct stimulator of the disease on the variation can make clearer the great polymorphism with which the deformations caused by certain diseases appear. Why, then, does not syphilis provoke only one type of deviation, the mechanism of which could be explained, but provoke, on the contrary, the whole scale of different deformations of teeth, maxillae, and face? Why does it act in so many different ways? It is logical to think that the cause of such a variety must not be looked for in a faculty of the disease itself to provoke different somatic transformations, but rather in a faculty of the surroundings, that is, the ground upon which the disease acts, a ground capable of reacting in different ways. And, referring particularly to the somatic field, nowhere else could be found more easily an element disposed to receive the stimulus coming from a disease than in the natural tendency toward a determined morphology of the organ.

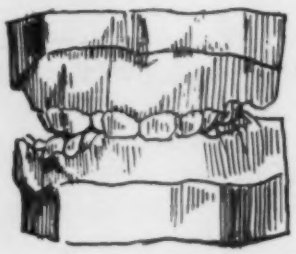

Fig. 12.

B. *Indirect action of the disease upon the active variation factor:* In this case the question is about an indirect action of the disease upon the variation, in which it is necessary to consider the influence of the disease in so far as it determines an alteration of the mineral metabolism of the bone and, therefore, a lack of compactness and insufficient resistance of it; that is, if the bone, destined to sustain the efforts of the exogen agents in general, and of the muscles in particular, finds itself in the situation mentioned, it is evident that it suffers its consequences under the form of deformations. But that does not take place except in certain conditions, or, rather, according to whether the variations have a parallel direction of development or an opposite one to the direction of the muscular traction or to any other pression, for example, respiratory, or according to whether the question is about the bone's zones, dominated by the factor of variation, or about others, where its presence is excluded.

To make the conception clearer, we distinguish that which happens in the part of the organ subdued to the active variation factor from that which happens in the part of the organ not subdued to it, and, moreover, what happens when the impulse of variation is parallel to the muscular traction, and what happens when the same impulse has an opposite direction.

Beginning from the part of the organ which is subject to the factor of variation:

1. If the variation has a direction of development to which is unfolded also the action of a group of muscles, it may be supported by this muscular action, even heightened in such a way as to transform itself in deviation. So, for example, a mandible which is characterized by a predominating diameter transverse to the longitudinal one (Fig. 13), because of it the mandible being subject

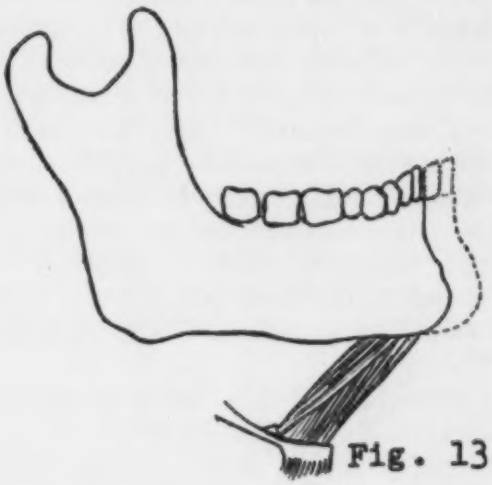

Fig. 13.

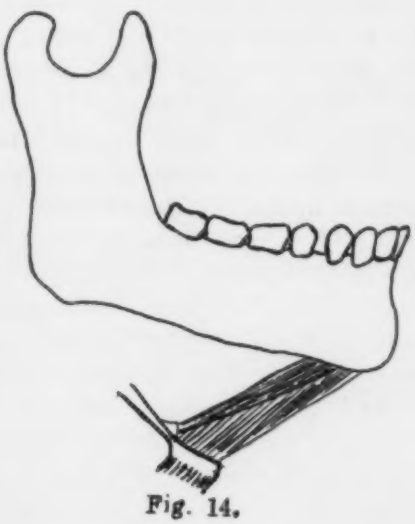

Fig. 14.

Fig. 15.

to an impulse that tends to make it remain short in relation to the surrounding bones, and is, moreover, affected by lack of bone solidity, does not oppose any resistance to the muscles of retraction; on the contrary, because of its tendency to be short, it yields easily to them, so that it slackens its growth in length, to the point of remaining hypoplastic.

2. If the variation has a direction of development opposite to the one on which the unfolding of the action of a group of muscles depends, this action does not deviate or stop the variation, because its evolvent tendency represents a ground on which nature fights against the action of any agents. So, for example, a mandible characterized by a predominance of the anteroposterior diameter to the transverse one, which submits to an impulse that tends to make it longer in relation to the surrounding bones, does not yield to the action of the retractory muscles, even if it is affected by lack of bone solidity, but, owing to its tendency to be long, reaches the dimensions for which it was destined (Fig. 14).

Considering the organ that is not subdued to an influence of a variation factor, we find a different behavior because no particular evolvent tendency intervenes in order to support its growth and form. Here the influence of exogen agents dominates unconditionally. Muscular tractions not only hinder in a special way the normal growth of the bone, but also constrain it to deformity under their action. An example is offered to us by a mandible subject to a long variation and affected by alteration of its mineral metabolism. It will not suffer a reduction of its length, thanks to the variation factor, which supports this characteristic, but, yielding to the downward traction of the muscles, it will undergo a deformation which, more or less, will drive it away anteriorly from the superior maxilla (Fig. 15).

Anatomic regions which, thanks to a particular evolvent energy, are not subject to the influence of a disease, can combine with anatomic regions that, excluded from such energy, submit to the influence of the disease, preparing a ground capable of reacting differently to the action of the exogen agents.

Hence, in this case, also, the great polymorphism arises, with which the disgnacies occur, a polymorphism that cannot be explained with the mere theory of the yielding of the mollified bones to the action of exogen factors, but also with the theory of the influence of the individual variation factors. In fact, if it were not so, we would always have to find in the rachitis only a unique dento-maxillary deformity always determined by the traction of the same muscles over the same mollified bones, while, on the contrary, we find in it different deformities.

Via Adige, 2.

Editorial

Orthodontic Tolerance

It is interesting to thumb through a paper on orthodontic economics by Dr. Harry Sorrels, of Oklahoma City, Oklahoma.

The paper was edited for the economics committee of the Postgraduate School of Orthodontics of the University of Kansas City. It is of added interest because it is obviously designed as an indoctrination or a briefing proposition for the young dentist about to embark into practice of the specialty of orthodontics subsequent to graduate work.

The paper reflects much thought, time, experience and even research upon the subject of orthodontic economics and covers many angles of the practice as a specialty.

Under the head of transfer of cases from one orthodontist to another, the hypothetical question is asked, "In accepting transfer cases should an initial starting fee be charged, if treatment plan and appliance construction follow what has been instituted previously?"

The author's answer is a positive "No." Added comment, however, reveals that cooperation of the two orthodontists and the patient is essential under such circumstances and, above all, moral confidence, that intangible but valuable something, must not be shattered; the inferential thought is left that courtesy under such circumstances is a must. Men who are located close to girls' and boys' private boarding schools, the students of which come from everywhere, may be deluged with "carry over" cases from distant localities so much so that the report is they find such cases at times quite burdensome. Men located in popular resort areas also find the same to be true; they report it difficult to carry on treatment with many cases equipped with every kind of mechanical device. The man to whom the case is transferred may approve of the treatment in progress or he may not; notwithstanding, the best interests of the patient and the specialty must be served. This is sometimes difficult because orthodontics is not an exact science. It is an applied science and unfortunately there is wide divergence of opinion and methods among its workers as to when treatment may be good or when it may be bad, when it makes sense or when it does not, what appliance is good and what appliance is bad.

Patients are saying they are unable to see why you band all the teeth in one state and in another you do not. Patients are bewildered by one orthodontist shaking the finger of caution about getting into the hands of another with a different "system."

To confuse the situation further, there are mature operators today who will treat no cases under the age wherein the canine has not erupted. There are others who with a religious fervor of belief treat cases at one-half that age. Who is to say either school is all wrong or all right? Orthodontics is not an exact science so you say, "So what," to this confusion. Many of the answers

are based on nothing more accurate than a matter of opinion. Certainly we should strive to find a more common denominator than one thousand different opinions (Sorrels).

Dr. Sorrels has a fine idea in indoctrinating young men with something fundamental; if carried on in other graduate courses it will do much to insulate students against orthodontic intolerance that is becoming too prevalent and carries grave danger of possible reverberations of broken confidence in the specialty by the public. This Sorrels idea obviously is the right way to offset much of these troubled waters. They were not so important in the past but are vital now when all health specialties are on the spot.

It is time to be alerted in professional affairs to what the automobile people found out years ago, that they must teach their young men coming up in the business to say that the competitive car is a good car too and never to say that the other car is very bad. The automobile people quickly learned that brick bats hurled hurt the industry and are quick suicide for that valuable intangible known as moral confidence.

Orthodontics is in need at this time more than ever before of a vigorous indoctrination about the golden rule in transferring cases. Bitter lifelong enemies have been made by careless and thoughtless handling of such cases.

One thing is certain—the orthodontist to whom the case is referred must lean backward and employ a wholesome creed of the golden rule, not only because it is the right thing to do, but also for the very practical reason that he himself may be the next to have his patient fall in another's hands, where he will hope for tolerance with eyes uplifted and palms pressed toward each other in the hope that his patient is in the hands of one with tolerance in his soul.

Dr. Sorrels could have added in his indoctrination brief that tolerance and understanding of the other fellow's viewpoint and methods of treatment are the greatest need of orthodontics today and that intolerance, by breaking public confidence, is the one thing that can destroy the entire structure upon which the specialty has been built.

It is to be hoped that graduate schools of orthodontics will add to their curriculum a course in the very things covered in the Sorrels paper.

H. C. P.

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Some Aspects of the Anatomy and Pathology of the Temporomandibular Articulation. By Harry Sicher, M.D., *The Bur*, vol. 48, no. 1, April, 1948.

ARTICULAR FOSSA

Authors who have discussed the consequences of displacement of the condyle seem to agree that pressure is exerted on the tympanic bone. This is completely wrong. A very important feature of the articular fossa has been entirely neglected, namely, the presence of a posterior articular lip. Behind the deepest excavation of the articular fossa the squama of the temporal bone is bent downward and forms a well-marked posterior boundary of the articular groove. This posterior lip, to which the articular capsule attaches, is bounded inferiorly by the "petrotympanic" fissure against the flat or slightly concave anteroinferior surface of the tympanic bone.

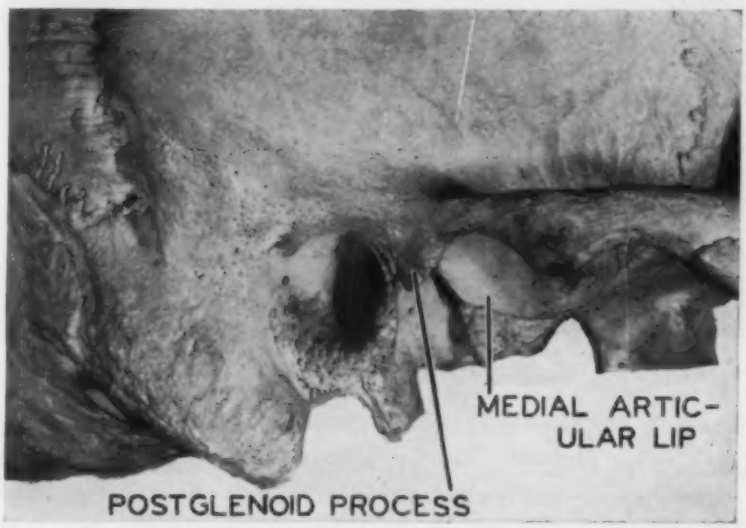

Fig. 1.—Well-developed postglenoid process.

In most individuals the posterior articular lip is higher and thicker at its lateral end and thus is seen in profile as a cone-shaped process between the articular fossa and tympanic bone. This postglenoid process is highly variable, but even its apparent absence does not indicate the absence of the posterior articular lip. If the postglenoid process is well developed (Fig. 1), it becomes immediately obvious that the acoustic passage and the articular fossa are well and safely separated. It is, however, of greatest importance to realize that a displacement of the condyle backward and upward is always directed against

the posterior articular lip and not against the tympanic bone. Even if the posterior lip is limited to the lateral half of the articular fossa it must be clear that it prevents a direct influence of the condyle on the tympanic bone.

Some authors claim that after loss of teeth a medial displacement of the condyle may also take place. Here again the formation of the articular fossa prevents any such displacement. The inner boundary of the fossa is always elevated to an internal or medial articular lip which leans against the downward protruding angular spine of the sphenoid bone. The medial lip serves for the attachment of the articular capsule. It is always quite prominent in young individuals, but in adults it is also often elongated into a triangular bony process with a sharply pointed inferior corner (Fig. 2). In this case the term temporal spine seems appropriate. In any case, however, the internal boundary of the articular fossa is quite distinct and only the fracture of the internal lip or its destruction could permit a medial displacement of the condyle. The presence of the medial articular lip also prevents a lateral displacement of a condyle, since this could occur only with simultaneous medial displacement of the other condyle.

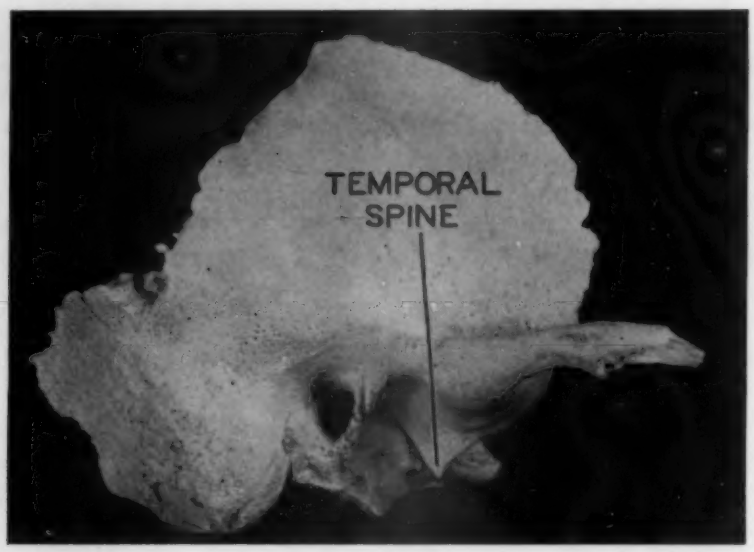

Fig. 2.—Inner articular lip elongated to a temporal spine.

THE "PETROTYMPANIC" FISSURE

The fissure that separates the articular fossa from the tympanic bone is, as a rule, described as the petrotympanic fissure or Glaserian fissure. This description is incorrect, because the articular fossa and the articular eminence are parts of the temporal squama. In reality the described fissure is a tympanosquamosal fissure in its lateral part. More medially a bony plate intervenes between squama and tympanic bone, protruding between the two as the tip of the tongue protrudes between the lips. This bony plate is the edge of the roof of the tympanic cavity, the tegmen tympani (Fig. 3). This roof, part of the anterosuperior surface of the petrous pyramid of the temporal bone, slopes forward and downward and its inferior edge becomes visible on the inferior aspect of the temporal bone between squama and tympanic bone. The medial part of the tympanosquamosal fissure is thus divided into an anterior part, the petrosquamosal fissure, and a posterior part, the petrotympanic or Glaserian fissure.

Since the lateral end of the latter is widened to permit the passage of the chorda tympani and the anterior tympanic blood vessels, it has attracted so much attention that all the other details have been neglected.

However, the presence of the inferior edge or process of the tympanic roof is a rather revealing detail because it is interposed between the tympanic bone and squama and the posterior displacement of the condyle is directed against this ledge of bone and not against the tympanic bone itself.

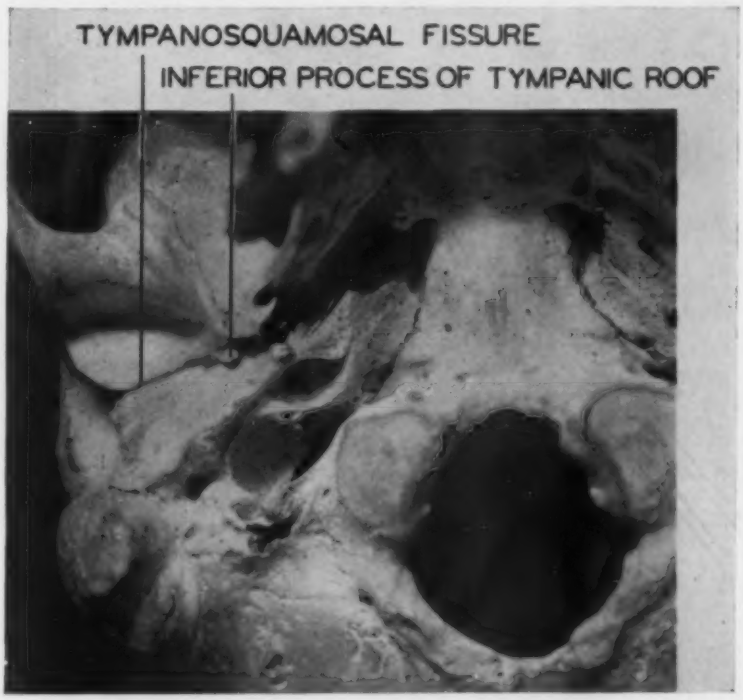

Fig. 3.—Well-developed inferior process of the tympanic roof. In front of it, the petrosquamosal fissure; behind it, the petrotympanic fissure.

DEFECTS OF THE TYMPANIC BONE

A frequently repeated assertion is that the tympanic bone is sometimes eroded by the pressure of the displaced condyle, which thus encroaches on the external acoustic meatus. It has to be recognized that the defects of the tympanic bone which are frequently observed are caused by an arrest of development and are not traumatic defects (Fig. 4).

At birth the tympanic bone is represented by a thin bony ring, not quite closed at its superior pole. From this ring two processes grow laterally which unite, usually at the end of the second year, and then surround a wide defect, the foramen of Huschke. This defect is gradually closed in the next two or three years. However its site can still be recognized in the adult as the thinnest part of the floor of the external acoustic meatus. On its inner side a depression of the bony floor may remain, sometimes perforated by a few small openings. In 20 per cent of all skulls examined a larger defect persists in the floor of the meatus (Fig. 5). A study of the relation of the mandibular condyle and this defect of the tympanic bone reveals that it could not possibly be caused by a posterosuperior displacement of the mandible.

In evaluating the relations of the mandibular condyle one more source of errors has to be recognized. This is the distortion of the mandible of dry skulls. The shrinkage causes mainly a shortening of the intergonial and intercondylar distance, which may, in extreme cases, be more than 10 mm. It is clear that in such cases the mandible does not fit the base of the skull and that an attempt to place the condyle into the fossa results either in gross asymmetries in its position, or in a medioposterior displacement of the condyle. Then its medial pole assumes a much closer relation to the posterior border of the articular fossa than it had in the living individual.

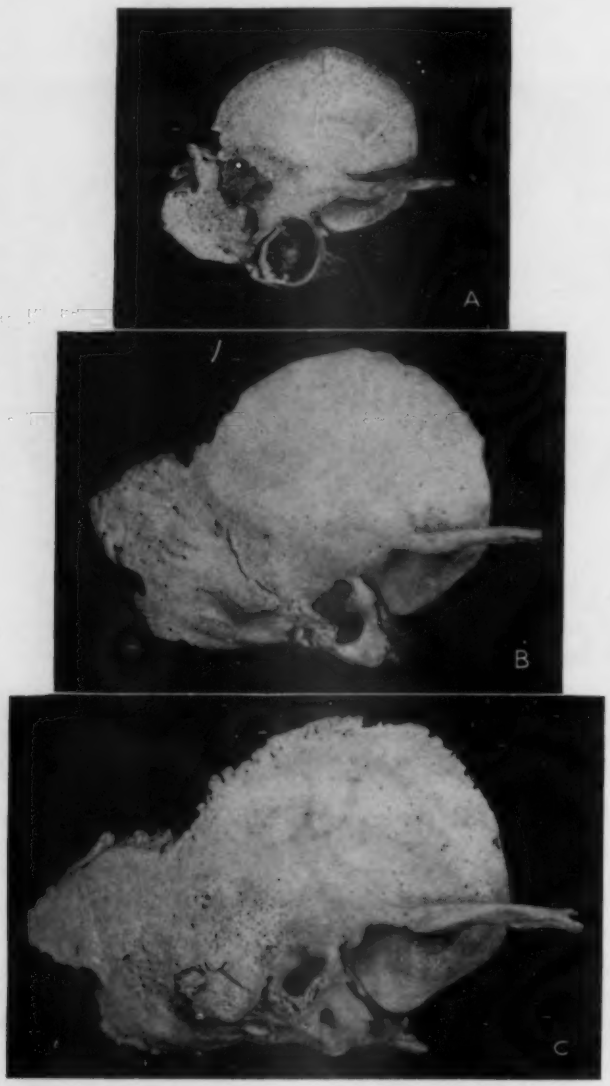

Fig. 4.—Development of the tympanic bone. *A*, Tympanic ring of the newborn. *B*, Anterior and posterior tympanic processes at the end of the first year. *C*, Foramen of Huschke at four years.

TYMPANIC CAVITY AND BONY PART OF EUSTACHIAN TUBE

In the face of the vague statements on the relation between the mandibular articulation and the tympanic cavity and pharyngotympanic tube, a more detailed description of their topography seems necessary. Diagrammatically, the

tympanic cavity is a narrow space between the tympanic membrane and the bony capsule of the inner ear (Fig. 6). Its upper wall or roof faces the middle cranial fossa, the floor is partly hollowed out by the jugular fossa housing

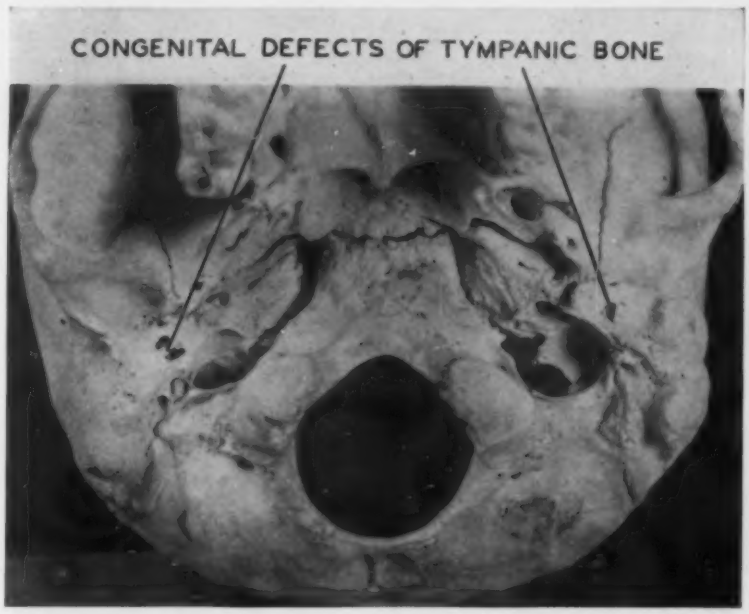

Fig. 5.—Persistence of the defect of the tympanic bone on the skull of a 16-year-old female with complete and perfect dentition.

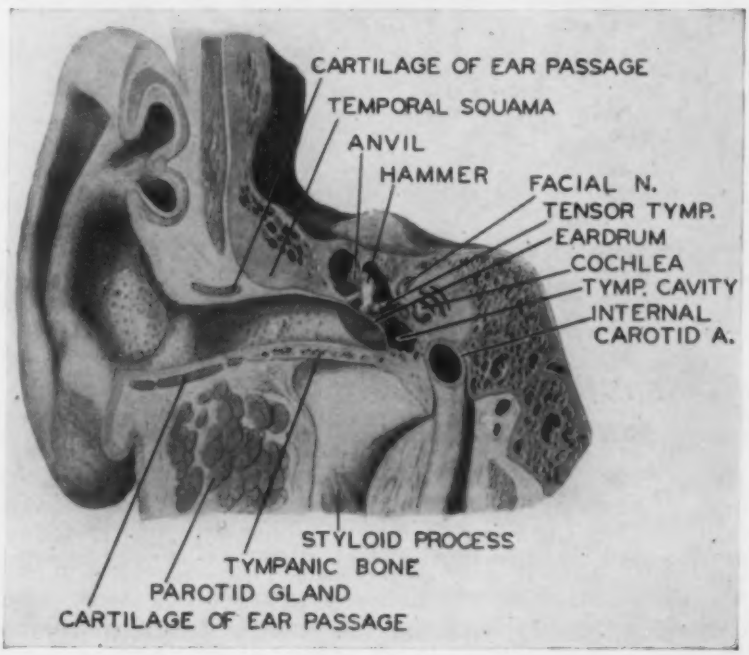

Fig. 6.—Frontal section through outer, middle, and inner ear of an adult (Tandler).

the upper bulb of the internal jugular vein. The posterior wall is directed toward the mastoid part of the temporal bone and, in its upper part, contains an opening, the entrance into the mastoid antrum. The anterior wall is in close

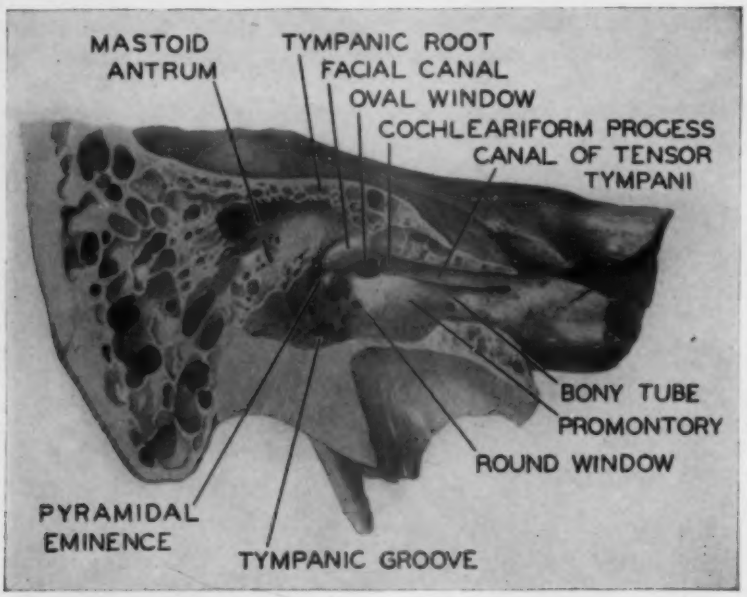

Fig. 7.—Vertical section through a temporal bone in the plane of the musculotubarian canal (Tandler).

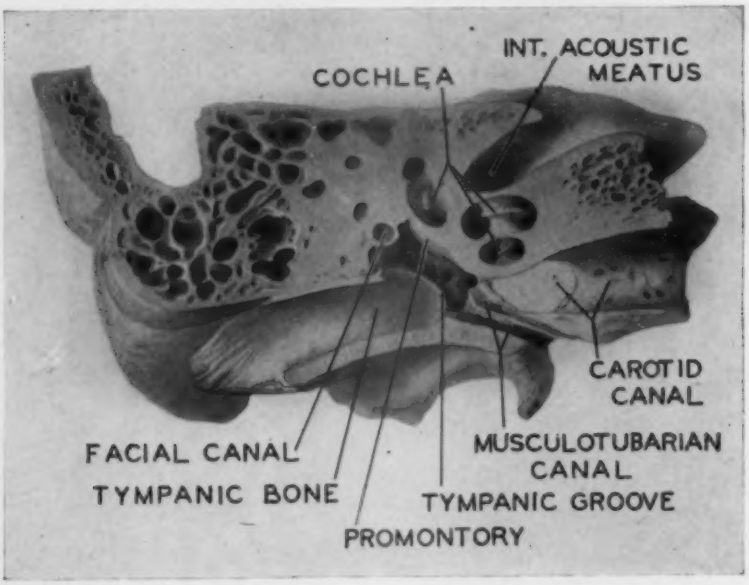

Fig. 8.—Horizontal section through a temporal bone at the level of outer acoustic meatus and bony tube (Tandler).

relation to the carotid canal, containing the internal carotid artery. The upper part of the anterior wall, however, is defective and leads into a canal that is divided into an upper and a lower compartment. The former contains the tensor tympani muscle, the latter is the bony part of the acoustic tube.

The narrow space of the tympanic cavity is placed obliquely in the temporal bone, its outer and inner walls facing outward, forward, and downward. Its anteroinferior corner thus is at the same time placed farthest medially. This is the reason the tympanic cavity is in spatial relation to the most medial part of the mandibular articulation only (Fig. 6). It is in this region that the bony part of the Eustachian tube begins, running forward and medially. Only the shorter lateral part of this canal is behind the mandibular fossa, while the longer medial part is separated from the articulation by the medial articular lip and the angular spine of the sphenoid bone (Figs. 7, 8, and 9).

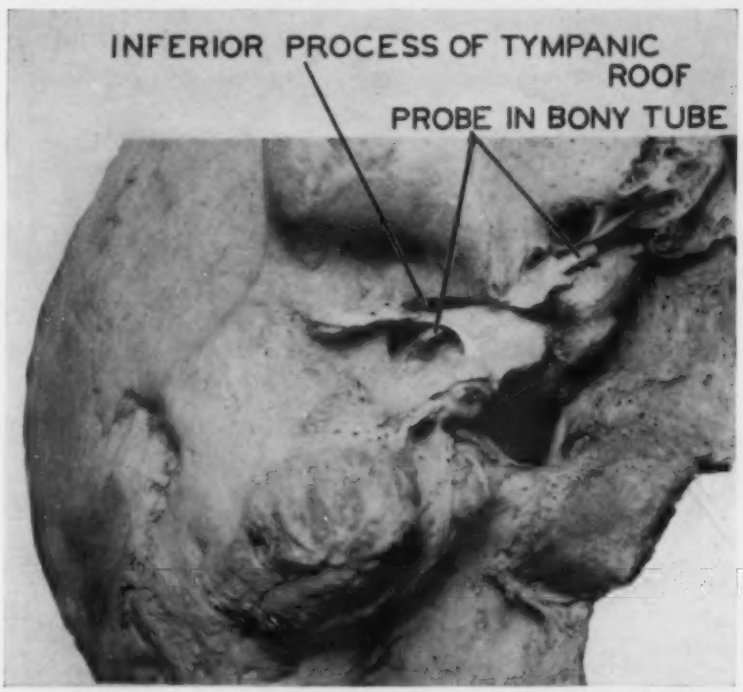

Fig. 9.—Relation of tympanic cavity and bony tube (probed) to articular fossa. Anterior wall of acoustic meatus has been removed.

However, the relations of tympanic cavity and mandibular condyle are by no means intimate. Here again the posterior articular lip, reinforced by the inferior process or edge of the tympanic roof, intervenes between the cavity of the joint and the condyle and the tympanic cavity and tube. A posterior and superior displacement of the mandibular head is thus primarily directed against the bony posterior wall of the articular fossa and not against the tympanic bone, which forms the anterior wall of the middle ear. The tensor tympani muscle, occupying the superior compartment of the musculotubarian canal, is still farther removed from any influence of the displaced condyle.

THE CARTILAGINOUS PART OF THE EUSTACHIAN TUBE

A glance at a skull or a wet specimen should suffice to dispel any hope that acoustic disturbances could be explained by a compression and degeneration of the cartilaginous part of the Eustachian tube by the mandibular condyle. There is not the remotest relation between the cartilaginous tube and the temporomandibular articulation (Figs. 10 and 11).

Just as the cartilaginous tube is safe from any encroachment by the displaced condyle, so also is the tensor palati. A "piling up" of soft tissue against the anterolateral membranous wall of the tube and against the tensor palati has also been adduced to explain a closure of the tube. This idea originated evidently from observations on the cadaver where, under passive movements, overstretched muscles fold, whereas they contract in the living.

Fig. 10.—Temporomandibular articulation dissected from behind. Relations of auriculotemporal nerve and cartilaginous tube.

THE AURICULOTEMPORAL NERVE

The auriculotemporal nerve has no close relations to the mandibular articulation and cannot possibly be compressed by a displacement of the condyle. From the oval foramen, the exit of the third trigeminal division from the skull, the auriculotemporal nerve runs backward and downward. After encircling the middle meningeal artery with two roots, the nerve lies on the medial surface of the external pterygoid muscle (Figs. 10, 11 and 12), which separates the nerve from the mandible and the articulation. The auriculotemporal nerve reaches the posterior border of the mandibular neck below the insertion of the external pterygoid muscle and crosses the neck of the mandible below the attachment of

the articular capsule. At this point the auriculotemporal nerve divides into a superior and an inferior branch. The latter joins the facial nerve and supplies the posterior part of the cheek. The superior branch curves upward in front of the cartilaginous acoustic meatus and reaches the temporal region. It supplies the articular capsule, parts of the outer ear, and the skin of the temple with sensory fibers. The postganglionary parasympathetic visceral secretory nerves for the parotid gland, which arise in the otic ganglion, are carried to the gland in twigs of the auriculotemporal nerve.

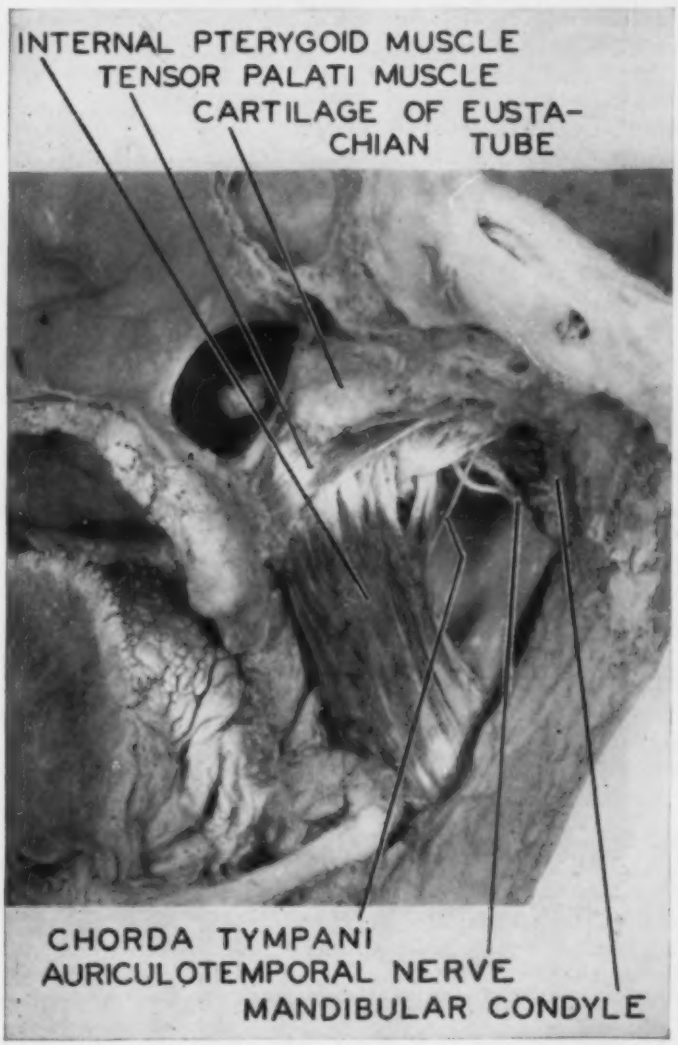

Fig. 11.—Temporomandibular articulation dissected from medial. Relations of auriculotemporal nerve, chorda tympani, cartilaginous tube, and tensor palati muscle.

There is only one danger for the auriculotemporal nerve, namely, a fracture of the mandibular neck. An impingement of the condyle on this nerve is entirely impossible. Symptoms of pressure on this nerve should also include pain in the cheek, and the conspicuous lack of this symptom in the literature under discussion is therefore most interesting.

THE CHORDA TYMPANI

Pain in the tongue and ill-defined paresthesias have been attributed to pressure on the chorda tympani. A study of the course and the relations of this nerve, however, proves that it is well protected against an impingement by a displaced condyle. The chorda tympani is a branch of the facial nerve and is composed of taste fibers and preganglionary parasympathetic visceral secretory fibers. The former serve the anterior two-thirds of the tongue, the latter end on the cells of the submaxillary ganglion which send the postganglionary fibers to the submaxillary, sublingual, and anterior lingual glands. The chorda tympani does not contain pain fibers; its compression could therefore not elicit pain in any event.

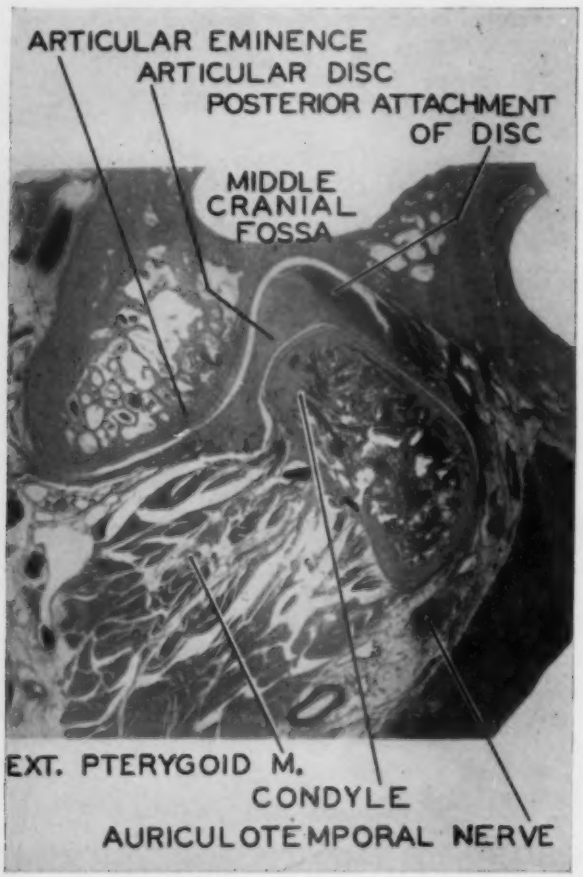

Fig. 12.—Sagittal section through a normal mandibular articulation of an adult (Courtesy, S. W. Chase).

The chorda tympani passes through the tympanic cavity. It enters the middle ear through a small opening in its posterior wall, curves forward between the hammer and anvil and leaves through an opening of the petrotympanic fissure. Then, however, the chorda tympani continues its course in the depth of this fissure behind the inferior edge of the tympanic roof, passes behind the angular spine, and turns forward on its medial surface, which is often grooved to receive the small nerve. Only after crossing the sphenoid spine does the chorda tympani emerge from the protection of the bone and run forward and

downward to reach the lingual nerve which leads the fibers of the chorda tympani to their destination. It is obvious that the condyle could compress the tympanic cord only after extensive destruction of the posterior bony wall of the articular fossa, which nobody has yet observed.

THE PHYSIOLOGY OF THE EUSTACHIAN TUBE

The function of the Eustachian tube is the renewal of the air in the tympanic cavity, which is slowly absorbed into the blood capillaries of the mucous membrane. In the earthbound human race this—and not the equalization of tympanic and outside atmospheric pressure—is accomplished by the repeated opening of the tube in swallowing. At rest the anterolateral membranous wall of the "cartilaginous" part of the tube is relaxed and the lumen of the tube is closed. The tensor palati muscle, arising from the sphenoid bone in front of and lateral to the sphenopetrosal fissure and from the scaphoid fossa at the root of the pterygoid process, also receives fibers from the membranous wall of the tube. The fibers of this thin muscle plate converge downward toward the pterygoid hamulus, around which the tendon of the tensor palati turns into an almost horizontal course. Spreading out, the tendon attaches to the posterior border of the hard palate and fuses across the midline with that of the other side. The tendon forms the fibrous "skeleton" of the soft palate and is here termed the palatine aponeurosis.

The tensor palati muscle contracts simultaneously with the levator palati during deglutition. At the same time that the soft palate is tensed and elevated, the tube is opened and air can enter the middle ear. The influence of the tensor palati on the tube is not regulated by a reflex, but is incidental to the often repeated act of swallowing. Contrary to a widely held opinion, swallowing does not always occur while the teeth are in occlusion. At least in drinking, the lower jaw is in rest position or even farther removed from the upper jaw. The notion that many individuals are not able or hardly able to swallow while the jaws are apart is an error deduced from attempts to swallow with an *empty* mouth. In this condition it really is more difficult to swallow while the teeth are not in contact.

Since man has learned to move rapidly from ground level to higher altitude, or to submerge himself in submarines below sea level, the differences in external and tympanic air pressure make a *voluntary* and *conscious* ventilating of the middle ear necessary. Neglect to do so, as has sometimes happened under the mental strain of combat flying or submarine service, can lead to severe ear symptoms mostly associated with pain, but this "syndrome" is on a psychologic rather than an organic basis.

An influence of mandibular overclosure on the action of the tensor palati muscle is entirely imaginary. But even if one assumes, for argument's sake, that overclosure could impair the action of this muscle on the tube, one has to remember that swallowing often occurs while the jaws are opened and then even the imaginary influence on the tensor palati disappears.

Whether occlusion of the Eustachian tube is correlated to mandibular overclosure is still controversial. Since direct or indirect compression of the tube by the displaced condyle is impossible, and since an impairment of the action of the tensor palati muscle can be ruled out, the cause of dysfunction of the tube could only be a chronic swelling or edema of its mucous membrane by a lymphatic or venous stasis. One could think of the dense venous plexus surrounding the mandibular articulation and of the possibility of thrombosis of these veins, which drain into the plexus of veins surrounding the internal maxillary artery.

TENSOR TYMPANI AND STAPEDIUS MUSCLES

Two muscles are connected with the auditory ossicles. The tensor tympani arises from the walls of the upper compartment of the musculotubarian canal. Its thin tendon bends around a bony pulley, the cochleariform process (Fig. 7), and inserts to the hammer. Supplied by the motor division of the trigeminal nerve, the tensor tympani pulls the hammer inward and thus tightens the tympanic membrane. The stapedius muscle arises from the walls of a small hollow pyramid behind and below the oval window (Fig. 7) and sends its tendon forward to the posterior leg of the stirrup. The stapedius muscle is innervated by a branch of the facial nerve. It swings the foot plate of the stapes laterally like the wing of a door and limits its mobility. The two muscles act reflectorily to protect the inner ear, the tensor tympani probably primarily against sound waves of great amplitude (loud noise), the stapedius against sound waves of great frequency (high tones).

The contraction of the two muscles of the middle ear is, as a rule, reflectory and is elicited by impact of sound waves upon the ear drum.

Skeletal muscles, normally acting reflectorily, that is involuntarily, may contract if related muscles or muscle groups are activated voluntarily. By coinnervation these muscles come indirectly under the influence of volition. As an example the cremaster muscle may be mentioned. It is a derivative of the internal abdominis oblique muscle and continues from the inguinal canal along the spermatic cord to the testis. It can lift the testis in the scrotum and bring it closer to the body wall and into a more protected position. The cremaster normally acts reflectorily and its contraction can be initiated by scratching the medial aspect of the thigh. However, by voluntary contraction of the broad abdominal muscles many individuals can also coinnervate the cremaster muscle.

A similar phenomenon can be observed in the middle ear. Some persons hear a buzzing sound in the ears if they strain the palatine muscles as if in preparation to saying aaaah, or if they forcefully close the eyelids. It is difficult, of course, to ascertain whether the tensor tympani or stapedius or both muscles cause the short buzzing sound by their contraction.

This observation is of interest because it lends some probability to an indirect influence of changes in the mandibular articulation on the ear. In overclosure of the mandible spasms of the elevators of the lower jaw may occur and, by coinnervation, cause contractions of the tensor tympani muscle. This in turn could cause tinnitus and pain in the ear drum. Whether damage to the middle ear could ensue is an open question.

It has also been asserted that compression of the anterior tympanic artery by the displaced condyle may lead to degenerative changes in the tympanic cavity. The anterior tympanic artery, a branch of the internal maxillary artery, enters the middle ear through the petrotympanic fissure. It is highly improbable that this artery could be impinged upon by the condyle. But even if this should happen one has to remember that three other arteries contribute branches to the tympanic cavity: the stylomastoid artery, a branch of the posterior auricular or of the occipital artery; the middle meningeal artery where it crosses the roof of the tympanic cavity; and the inferior tympanic artery of the ascending pharyngeal artery. The tympanic branches of these arteries anastomose so widely that even the total occlusion of one of them could not impair the blood supply to the middle ear.

THE ARTICULAR DISC AND ITS MOVEMENTS

Most of the current descriptions of the articular disc do not make it clear that the disc proper is by far shorter in an anteroposterior direction than the articular surface of the temporal bone. It is important to realize that the pos-

terior border of the disc is far in front of the posterior wall of the capsule of the articulation (Fig. 12). The disc proper is, of course, only that part of the partition of the articular space that consists of avascular fibrous tissue and is thus recognizable as a pressure-bearing structure. While the anterior border of the disc fuses directly with the articular capsule, the posterior border of the disc is connected with the fibrous capsule by a thick pad of more loosely textured connective tissue which contains blood vessels and nerves. It is this tissue which fills the superior and posterior part of the articular fossa. Its structure proves that it does not bear pressure, which is in accordance with the well-known fact that the condyle articulates with the posterior slope of the articular eminence, the disc being interposed between the two bones where they are covered with a thick layer of avascular fibrous tissue.

The "roof" of the articular fossa, separating the articular fossa from the middle cranial fossa, is never under pressure. It is, as a rule, a thin translucent plate of bone.

It is also worth mentioning that the capsule of the upper mandibular articulation (between the disc and the temporal bone) is very loose, in adaptation to the extensive sliding movements in this compartment of the joint. The capsule between the disc and the condyle is by far tighter, since the movements of the lower mandibular articulation are rotatory movements only. It may be said, therefore, that the disc is tightly bound to the mandible and loosely to the temporal bone. The connection of disc and condyle is especially strong and tight at the lateral and medial surfaces of the capsule, corresponding to the collateral ligaments of a hinge joint.

This behavior of the capsule explains why the sliding movements of the disc are directed and caused by the sliding movements of the mandible. It is easy to prove that the sliding movements of the disc are not primarily dependent on the protracting influence of the external pterygoid muscle. On a cadaver the sliding movement of the mandible causes a simultaneous movement of the disc, regardless of whether the mandible is simply protruded or whether an opening movement as a combination of translatory and rotatory movements is executed. It is of course the tight fixation of the disc to the mandibular head that forces the disc and mandible to move in unison. In addition, it is clear that in the living the disc follows the retruding movement of the mandible though none of the retractors of the mandible—the deep part of the masseter and the posterior part of the temporal muscle—finds an attachment to the disc.

THE EXTERNAL PTERYGOID MUSCLE

The external pterygoid muscle arises with a larger inferior head from the lateral surface of the lateral pterygoid plate and with a much smaller superior head from the infratemporal surface of the greater sphenoid wing. Converging laterally and posteriorly the fibers are attached partly to the articular capsule and to the disc, but mainly to a rough groove on the anterior surface of the neck of the mandible. It is not correct to separate the superior head as sphenomeniscal muscle, because often fibers of the upper head also attach to the bone. The attachment of the muscle to the disc is comparable to that of other muscles to articular capsules, preventing the capsule from being caught between two moving bones. For example, deep fibers of the brachialis muscle attach to the capsule of the elbow joint, and fibers of quadriceps femoris muscle attach to the capsule of the knee joint.

The function of the external pterygoid muscle has often been discussed. Here, however, as in most other parts of the body, movements are the result of contraction of muscle groups, and one muscle often provides only one component of several possible movements. Thus the action of a muscle may depend

on the behavior of other muscles. This is valid for the external pterygoid muscle. It is the only muscle which exerts a forward pull on the mandible, be it symmetrical or unilateral. It is self-evident that this muscle must be active in two movements of the lower jaw: in the simple forward thrust and in normal opening, which is a combination of rotation and forward sliding. Which one of these two movements occurs is dependent entirely on the behavior of the two other main groups of mandibular muscles, namely, the elevators and the depressors. The elevators are the masseter, the internal pterygoid, and the temporal muscles; the depressors are the geniohyoid, the mylohyoid, and the digastric muscles. Both groups also have a retracting component: of the first group, the deep portion of the masseter and the posterior part of the temporal muscle exert a backward pull; in the second group, mainly the geniohyoid and partly the digastric have this function. The suprahyoid muscles act upon the mandible only if the hyoid bone is fixed by the action of the infrahyoid muscles. If the external pterygoid muscle actively contracts, while the elevators maintain a slight tension and the depressors relax, the jaw will be thrust forward. If, during active contraction of the external pterygoid muscle, the elevators relax while the depressors maintain a slight contraction, the jaws will open.

It is, however, of greatest interest that the external pterygoid is also active in the closing phase of all masticatory movements. If, for instance, a piece of meat is to be cut between the molars, the condyle is in a precarious position on the posterior slope of the articular eminence. Before the teeth come into occlusion, before the interlocking cusps can check the mandibular movement and balance condyle and disc securely on the oblique plane of the tubercle, only the external pterygoid muscle can prevent a backward and upward displacement of the condyle and the disc. One should not forget that the greatest force of the elevators and retractors of the lower jaws is exerted before the teeth reach the occlusal position. That the "opener" of the jaws functions also as a balancing or braking element during forceful closing is entirely in accord with the physiology of muscles in other parts of the body.

It is during the action of the external pterygoid muscle as a balancing force that its attachment to the disc becomes effective, to secure the correct relation of disc and condyle to the articular eminence against the powerful forces of the closing muscles, which threaten to destroy the precarious equilibrium.

CONDYLAR DISPLACEMENT IN MANDIBULAR OVERCLOSURE

It is necessary to stress the fact that loss of teeth, severe occlusal wear, or unsatisfactory reconstructive dental work may lead to severe damage in the temporomandibular articulation. Overclosure of the jaw or distal displacement of the condyles leads primarily to a dislocation of the lower compartment of the mandibular articulation. The balanced position of disc, condyle, and temporal bone is dependent on, and maintained by, muscular action. In overclosure the holding force of the external pterygoid muscle is either eliminated, in consequence of painful stretching of the discocondylar capsule, or it is overcome by the retracting component of the elevators. Then the lack of a retractor of the disc leads to a distal dislocation of the condyle to the disc. In other words, the condyle impinges upon the connective tissue behind the disc proper that connects disc and capsule. This tissue contains nerves and blood vessels in contradistinction to the avascular and nerveless disc. Pressure on this tissue will not only cause pain but will also lead to disturbances of the circulation. This in turn leads to degeneration of the disc and the fibrous covering of the articulating bones, since these tissues are nourished from the synovial fluid produced by the synovial capsule.

The dislocation of the condyle behind the disc severely impairs the opening movement. The disc no longer functions as a conveying rest for the condyle, but the latter is brusquely pulled over the posterior edge of the disc and the condyle pounds against the disc and articular eminence. If there is any pressure against the roof or the posterior wall of the articular fossa it is insignificant. Careful histologic studies of diseased joints have shown that the degenerative changes are restricted to the condyle, the articular eminence, the disc, and the capsule.

This is readily understood if one realizes that abnormal pressure is exerted mainly in the last phase of closing and the first phase of opening movements.

The pathologic picture of the articular changes, clearly established by macroscopic and histologic investigation, is that of a degenerative osteoarthritis of traumatic origin. The pain associated with these progressive changes is irradiating pain, as is so often observed in diseases of deep structures. Though the mechanism of referred or irradiating pain is not clearly understood, it is certain that peripheral nerve connections or pressure on peripheral nerves is not the cause of this phenomenon.

In conclusion it must be stressed that severe chronic damage to the temporomandibular articulation is the consequence of mandibular overclosure or displacement. Close attention should be paid to maintain or to re-establish normal occlusal relations in order to prevent or to treat a traumatic arthritis of the mandibular articulation.

News and Notes

Elected Officers of the American Association of Orthodontists for 1949-1950

The following were elected to the committees of the American Association of Orthodontists for two, three, five, and seven years:

Budget Committee: Glenn F. Young, 2 years, 1951.
George H. Siersma, 3 years, 1952.
Publication and Editorial Board: Silas J. Kloehn, 3 years, 1952.
Public Relations Committee: Frank P. Bowyer, 3 years, 1952.
Education Committee: L. B. Higley, 3 years, 1952.
Research Committee: J. A. Salzmann, 3 years, 1952.
Judicial Council: Walter S. Sargeant, 3 years, 1952.
Relief Committee: Frederick T. West, 3 years, 1952.
Laws and Infractions Committee: Holly Halderson, 5 years, 1954.
Constitution and Bylaws Committee: Philip E. Adams, 3 years, 1952.
American Board of Orthodontics: Leuman Waugh, 4 years, 1953; C. Edward Martinek, 7 years, 1956.

Glenn Young was elected to complete the unexpired term of Henry U. Barber, Jr., deceased, and Leuman Waugh was elected to fill the unexpired term of James A. Burrill, resigned.

The existing Public Health Committee and Military Affairs Committee were authorized by standing resolution of the Board of Directors to continue without change, pending official creation of these two committees as standing committees by changes in the bylaws which are now being processed. The personnel of these committees are listed in the New York program.

The newly elected officers are:

President, Max E. Ernst, 1250 Lowry Medical Arts Bldg., St. Paul, Minn.
President-Elect, Joseph E. Johnson, Starks Bldg., Louisville, Ky.
Vice-President, Sergio Giquel, 521 Neptune, Havana, Cuba.
Secretary-Treasurer, George R. Moore, 919 Oakland Ave., Ann Arbor, Mich.

Nominations for new officers were as follows:

Bernard G. deVries, President-Elect.
Homer B. Robinson, Vice-President.
George R. Moore, Secretary-Treasurer.

Central Section of the American Association of Orthodontists

The regular annual meeting of the Central Section of the American Association of Orthodontists will be held Sept. 25, 26, and 27, 1949, at the Sheraton Hotel, St. Louis, Missouri.

Earl E. Shepard, Secretary,
Lister Building, St. Louis, Missouri.

Oren A. Oliver Given Honorary Degree

On June 3, 1949, Dr. Oren A. Oliver, of Nashville, Tenn., was given an honorary Doctor of Laws degree from Emory University. On this occasion Dr. Oliver delivered the commencement address to the Colleges of Dentistry, Medicine, Law, and Theology. In his address he stressed the great need for all of the professional groups to correlate their efforts to preserve the principles of freedom and democracy. He urged each member of the graduating classes to assume a position of responsibility in his community, not only in his chosen field but also in all problems related to the welfare of the community.

Orthodontist Receives Sabin Award

Dr. Henry F. Hoffman, orthodontist of Denver, Colorado, and immediate past president of the Denver Public Health Council, received the Sabin Award at the annual meeting of the Colorado Public Health Association May 23.

The Sabin Award is presented annually to the person who has made the greatest continuing contribution to public health in Colorado. It was established to honor Dr. Florence Sabin, a Colorado physician, who after retiring from the research staff of the Rockefeller Institute devoted her entire time and influence toward the enactment of satisfactory health laws for the state of Colorado. As a result of this campaign the State Assembly passed three Sabin health bills. She is now head of the Department of Health of the city and county of Denver.

Dr. Hoffman, one of the original incorporators of the Denver Public Health Council, has acted five times as its president, and has helped in its development into one of the eleven public health councils in the United States to meet national standards for public health councils. During his terms of office, through his influence and that of the Council, a Division of Health with a full-time paid executive secretary was added to the Denver Area Welfare Council, the Rheumatic Fever Diagnostic Service was established at the University of Colorado Medical Center, and amendments to the city charter were passed which enabled the city of Denver to establish a modern health department.

In all program planning, Dr. Hoffman has taken particular care to see that dentistry has been adequately included.

His services continue as a member of the Planning Committee of the Health Division of the Denver Area Welfare Council.

The Camp Fire Club of America

The Camp Fire Club of America near New York City attracted so much attention when orthodontists held their annual recreation day there May 1 that some facts about the history and origin of this club will no doubt be of interest to the readers of the AMERICAN JOURNAL OF ORTHODONTICS.

The Club was formed about 1897 by a small group of enthusiastic big game hunters and wild life conservationists. Among the charter and early members were Theodore Roosevelt, Ernest Thompson Seton, Dan Beard, William B. Greely, William Hornaday, Edmund Seymour, David T. Abercrombie, and many nationally known leaders in wilderness life. The camp craft events for the Boy Scouts, such as fire building and flap jack making, were developed at the Camp Fire Club, and a close bond of activity has been maintained with the Boy Scout organization.

Several orthodontists of the New York area have been active members of the Club for some years. The late Henry U. Barber, Jr., a former president of the American Association of Orthodontics, was a very active member of the Club for some years previous to his death. Dr. Leuman Waugh was president of The Camp Fire Club in 1945 through 1947. Other members are Joseph D. Eby and Donald Waugh, and all have been active in its operation.

The Club is located in upper Westchester County, New York, between Ossining and Chappaqua, occupying a tract of about 220 acres. There is a main cabin with complete living

accommodations, a locker house, tool shop, sheds, etc., nine other Club cabins, and a caretaker's house and barn. There is a lake stocked with trout, canoes, a flycasting platform, and a good place to swim. There is a fine shooting center, with pistol, rifle, trap, and skeet ranges, and there are 220 acres of woods. The property adjoins the Bronx River Parkway Extension at Camp Fire Road, and is twenty minutes by taxi from Ossining or from Chappaqua. It is enclosed by a seven-foot game fence. The activities of the Club consist of its work for the conservation of forests and wild life, and of its entertainments in New York and at Camp Fire Club.

Its conservation work has been carried on for the past twenty-five years by the Committee for the Conservation of Forests and Wild Life. It was largely instrumental in the creation of Mt. McKinley National Park and Glacier National Park and the Waterton Lakes Park in Canada, and it has always been active in upholding the maintenance of the high standards of national parks. It took an active part in the negotiations of the Migratory Bird Treaty, and the constant increase of the seal herd is in large part due to its work at a time when the herd was almost at the point of extinction. It appeared many times in Washington and at Albany in support of wise and in opposition to bad measures, and follows closely all legislation affecting forests and wild life. The Club has always stood for the maintenance of the American system of open shooting for sportsmen of this generation and generations to come.

It is for men who know and love the outdoors, the forest, the stream, the jungle, be they hunters, fishermen, explorers, or naturalists, who can stand the long day and the empty stomach and the hard bed, who can fend for themselves, and use what nature gives, and sit before their campfire knowing their day has been well spent.

The campfire is the symbol of the outdoors. At it we warm ourselves when we roll out of our blankets, over it we cook our food, by it we dry our clothes, and in front of it we rest when the day is over. It warms us. It cheers us. It lives if it is fed. It dies if it is neglected. It is obedient to those who understand it. It is dangerous to those who are ignorant of it. It dispels the darkness, and in the circle of its light it shows us the faces of our comrades. It stands for what the woodsman, the hunter, and the fisherman hold dear. Because it is the symbol of the great outdoors, The Camp Fire Club bears its name.

Those who go out into the forest and plain and return to gather around their campfire have certain things—courage, hardihood, patience, endurance, persistence, generosity, honesty, and the sporting spirit, and these are the ideals of The Camp Fire Club of America.

There is a code of ethics like professional organizations that reflects a devotion to wild life and the outdoors. Its tenets may be reflected in the following code:

> The wild life of today is not ours to do with as we please. The original stock is given us *in trust*, for the benefit, both of the present and the future. We must render an accounting of this trust to those who come after us.
>
> It is the duty of every person who finds pleasure in the wilderness or in the pursuit of game, to support actively the protection of forests and wild life.
>
> A sportsman will not exceed his legal limit, nor take game or fish out of season.
>
> The sale of wild game is incompatible with the preservation of a proper stock of game, and should be prohibited by public sentiment and law.
>
> A sportsman in the field will not trespass on the rights of his fellows; will not injure or destroy private or public property, and will at all times exercise the highest degree of care in the use of fire; and in the protection of forest cover.
>
> An ideal trip consists of good comrades, fine country, few trophies, and the spiritual values that come from life in the wilderness.

That exemplifies the spirit of The Camp Fire Club of America where the members of the American Association of Orthodontists were so royally entertained May 1, 1949, at the New York Meeting.

New Edition Released

A completely rewritten edition of *Prenatal Care* was released recently by the Children's Bureau, Federal Security Agency. Oldest of the Bureau's booklets for parents, more than nine million copies have been distributed since it was first published in 1913.

While earlier editions of *Prenatal Care* stressed the need for medical care during pregnancy, they were confined largely to the personal hygiene of the mother, preventing complications, and preparing for confinement, usually for home delivery. Furthermore, each point was treated in considerable detail. There was good reason for such specific information. In the early days few babies were delivered by physicians, much fewer in hospitals. Even as recently as 1935, fewer than 40 per cent of all live births were in hospitals. Detailed directions given in the first editions of the booklet were helpful to midwives, fathers, friends, and others in attendance.

Today, in contrast, about 85 per cent of all live births are attended by physicians in hospitals, and another 10 per cent are attended by physicians outside of hospitals. Accompanying this jump in hospital births has been a substantial increase in recent years in medical care during pregnancy by physicians, either in private practice or in public clinics.

"Early and continuing medical care is just as important during pregnancy as it has always been," Katharine F. Lenroot, Chief of the Children's Bureau, stated today in releasing the latest edition of *Prenatal Care*. "But today the concept of good care for the mother and baby has broadened. We think more in terms of maternity care, which includes medical supervision from early pregnancy through the birth of the baby and for several weeks after. Healthy mothers and babies, comfortable pregnancies, and safe outcome of labor and the development of a happy mother-child relationship are the goals of good maternity care."

Pointing out that the booklet is no substitute for medical care, Miss Lenroot said the scope of the new edition has been broadened in order to supplement the advice doctors give expectant mothers and fathers.

Medical drawings of the embryo and the fetus at various stages, included in *Prenatal Care* for the first time, help to explain the discussion of the physical changes in pregnancy. Morning sickness, the Rh factor, premature birth, and the importance of blood tests are a few of the many things discussed informally in the booklet. The expectant mother is urged to consult her physician regularly, preferably one with special training in obstetrics.

Mental health is discussed at much greater length than in previous editions. One section deals with the thoughts and feelings of the expectant mother, another points out the importance of the father's role, and still another suggests ways to prepare other children for the new addition to the family so they will not feel neglected.

The franker attitude toward pregnancy, as well as the increasing medical care by physicians, makes childbearing easier today, Miss Lenroot said. An indication of the franker point of view, she continued, is the greatly increased demand for *Prenatal Care* in recent years, even in proportion to the larger number of expectant mothers than there were a decade or more ago.

Before publication the booklet was reviewed by a wide range of obstetricians, pediatricians, psychiatrists, nutritionists, nurses, and other specialists to make sure that it reflects the best current practices in good maternity care.

Running some 60 pages, single copies of *Prenatal Care* are available to parents and professional workers without charge from the Children's Bureau, Federal Security Agency, Washington 25, D. C. Copies may also be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., at 15 cents each, with the usual 25 per cent discount on 100 or more copies.

San Francisco Prepares for Ninetieth Annual American Dental Association Session

The ninetieth annual session of the American Dental Association will be held October 17 to 20 at colorful San Francisco.

American Dental Association

Isolation from human saliva of a biologically active fraction which may be effective in the prevention of dental decay, one of mankind's most common diseases, is reported in the May issue of the *Journal of the American Dental Association.*

The discovery was made by three dentists, Dr. T. J. Hill, Dr. Morris Matt, and Dr. Sholom Pearlman, and Miss Betty Jane White, bacteriologist, of the faculty of the School of Dentistry, Western Reserve University, Cleveland.

They reported that the extract has been fractionated or separated from the saliva of average persons in the minute quantities of 0.001 to 0.004 of 1 per cent. The extract was obtained in slightly larger amounts from the saliva of persons normally resistant to dental decay.

Preliminary laboratory tests have revealed that the extract has a retarding effect on the production of mouth acids which are believed to be the primary cause of dental decay.

The scientists said that when the extract was added to a dextrose broth in the proportion of one part to 500, the growth of the acid-producing bacteria known as *Lactobacillus acidophilus* was stopped completely. Used in lesser amounts, the extract was found to suppress the growth of the mouth bacteria over a period of twenty-four to forty-eight hours.

To date, the extract has not been tested on human beings. In experiments conducted on rats, it was found that injections of the extract tended to interfere with carbohydrate metabolism.

Full significance of the discovery will not be known until further research is completed, the scientists said. To date, the exact nature of the extract has not been determined, although the substance is known to be soluble in water and is insoluble in alcohol and ether.

The Netherlands has found that a compulsory health insurance law cannot make dental treatment available to all of its citizens, according to Dr. Charles F. L. Nord, an Amsterdam dentist and president of the Federation Dentaire Internationale, world-wide federation of national dental associations.

In the May issue of the *Journal of the American Dental Association,* Dr. Nord pointed out a major weakness in a plan very similar to the one now being proposed by President Truman. He said:

"Actually, of course, full dental treatment for everyone is out of the question. Not only would it require more than six times the number of dentists now in practice, but it would cost so much that no government could afford it."

Dr. Nord said that the Netherlands dentists are having difficulty providing dental care under a plan financed by a payroll tax on individuals earning up to $1,500 per year. He pointed out that much of the care is of an emergency nature. Pulp treatments are given only in special cases, and only simple fillings are made.

Because of this situation, Dr. Nord says the dental profession has persuaded Dutch authorities to work toward a solution of the problem along other lines. A special commission has been appointed to advise the minister on amendments to the law.

"It is the conviction of the profession," Dr. Nord wrote, "that the only way of eliminating the effects of dental disease is to begin with care of young children. In Amsterdam, with a population around one million, it is proposed to begin with a school dental program and expand it to include preschool children, as has been done in Oslo, Norway."

In operation such a plan as this would be similar to the dental health program for children of the United States now being recommended by the American Dental Association.

The Netherlands adopted its compulsory health service shortly after the recent war. Dr. Nord said that the people of his country seem to agree that this change of emphasis to dental programs for children is the only way to solve the problem.

Medical, Dental, and Veterinary Reserve Corps Officers Get Questionnaires

A survey among reserve officers of the Army Medical, Dental, and Veterinary Corps is being taken by means of a questionnaire, it was announced today by Major General R. W. Bliss, Surgeon General of the Army. The purpose of the survey is to determine the availability of these officers for short periods of duty ranging from one to twenty-nine days a month and for longer duty tours of varying lengths.

The questionnaire is simple in form and requires not more than a few minutes to fill out. Accompanying the questionnaire will be a letter of instruction containing all necessary information. The questionnaires and letters of instruction will be forwarded to the reserve officers by the state senior instructors. Return of the completed questionnaire does not in any way pledge or obligate the reservist to a return to active duty.

The response to the questionnaires will determine the possibility of establishing the program and the number of physicians, dentists, and veterinarians who would be available for either the short or longer periods of duty to help relieve the Army's critical shortages of these professional categories occasioned by the imminent separation of approximately 2,000 medical department officers trained under the Army Specialized Training Program.

The questionnaire is broken down into four plans, which would permit the reserve officer to enter active duty for periods of one day to three years. In brief, the plans are as follows:

Plan 1.—Reserve officers may volunteer for periods of active duty of one or more days a week, to perform professional duties at neighboring Army or Air Force installations. The officer may serve in his present (terminal leave) rank, earn points toward retirement and carry on his private practice without undue interference. The procedure of issuing orders, certification, and payment will be performed locally in order to avoid administrative delays and to permit the officer to devote full time to caring for patients. On a simple mathematical basis, under this plan, if 5,000 reserve officers of the more than 21,000 in the country volunteered for only three days a month for a year, the man-hours contributed would be equal to the full-time services of 600 physicians, dentists, and veterinarians.

Plan 2.—An officer may enter active duty for periods of from one month to a year. This plan is limited to specialists subject to certain provisions, namely, (a) movement of dependents or household goods and travel by private conveyance are not authorized; (b) officers volunteering for periods of at least six months will be permitted overseas assignments, but dependents may not accompany officer.

Plan 3.—An officer may enter activt duty from one to three years, nad by doing so receive $100 a month in addition to pay and allowances. Assignment, either in this country or abroad, will be made according to military requirements and the professional qualifications of the officer. Dependents and household goods may accompany officers.

Plan 4.—An officer may enter active duty for one year at an Army or Air Force installation immediately adjacent to his home. He will not be moved during the year, and may continue as much of his private practice as does not interfere with his military duties. He will receive $100 a month in addition to pay and allowances.

"The Army Medical Department is faced with an unparalleled peace-time emergency in carrying out medical requirements satisfactorily," General Bliss stated. "In time of military emergency, it is the reserve officer upon whom the great burden of effort and sacrifice has fallen. Today, we are again turning to reserve officers of the Medical Department for help."

Air Force Medical Service Is Established

General Hoyt S. Vandenberg, Chief of Staff, United States Air Force, announced today the organization of a United States Air Force Medical Service.

Its establishment within the Department of the Air Force follows directives issued May 13 by Secretary of Defense Louis Johnson to provide the Air Force with its own medical service and to establish a Medical Service Division within the Office of the Secretary of Defense.

The new Air Force medical service will provide better flexibility and control for Air Force medical services and requirements, and will provide more efficient and equitable coordination under unification of control within the National Military Establishment. No duplication will exist under the new organization since the Air Force previously had a medical service which, however, was under Army control.

Major General Malcolm C. Grow, Surgeon General of the United States Air Force, has been elevated to an organizational and functional position directly under the Chief of Staff, United States Air Forces. This same organizational pattern will be maintained throughout the Air Force.

General Vandenberg emphasized the great career opportunities that exist in the newly created United States Air Force Medical Service and announced that Air Force plans are designed to correct the major objections of professional people to a career in the Armed Forces. Toward this end, housing will be made available for medical officers and their families at all air bases where such facilities exist. Stability of assignment of Air Force medical personnel will be emphasized and transfers will be held to the essential minimum. An attractive career program will assure opportunity for medical and scientific advancement. Air Force doctors and other medical specialists are assured to opportunities for advanced training in both clinical medicine and research in aviation medicine. Professional facilities of general hospitals and laboratories, approved civilian institutions, and Air Force facilities will be used to provide regularly spaced training tours for members of the Air Force Medical Service. The Air Force will participate in joint staffing of selected Armed Forces general hospitals and laboratories.

Medical officers of the United States Air Force will be given every possible opportunity to pursue their specialty.

Doctors and dentists on duty with the United States Air Force will continue to receive the extra $100 per month. In addition, a percentage of medical officers, nurses, and enlisted technicians who qualify for flying duties will receive additional hazard pay.

It is the intention of the Air Force to administer promotions and rank distributions so that medical personnel of all categories will have an opportunity to begin their career and advance through the successive grades in accordance with their abilities and the responsibility held.

Officer personnel of the new Air Force Medical Service will consist of Regular, Reserve, and National Guard Air Force medical officers, dentists, nurses, medical allied scientists, veterinarians, women medical specialists, and medical service officers. General Vandenberg has announced that a comprehensive career development plan includes postgraduate training at both military and civilian institutions for all categories of specialists to provide the highest standard of medical care for the Air Force and to insure the professional stature of officers. He added that administrative support within the Medical Service would be so developed to relieve doctors of unnecessary nonprofessional duties.

The enlisted component of the United States Air Force Medical Service will be made up of airmen and airwomen who will serve at Air Force bases and within agreed percentages at general hospitals. A career monitoring program will assure continued assignments in their chosen field or specialty.

Under existing laws, the transfer of regular officers and reserve officers from the Department of the Army to the Department of the Air Force must be accomplished by July 26, 1949. Officers desiring to transfer should submit individual requests to the Adjutant General, United States Army, immediately.

The active Medical Service of the Air Force will be manned by both Regular and Reserve officers, the Reserve officers having the prerogative of serving limited periods of active duty if they so desire. Civilians desiring Regular or Reserve commissions in the United States Air Force Medical Service may apply directly to the Surgeon General, United States Air Force, Pentagon, Washington, D. C. Due recognition of prior professional training and previous military service will be given in original appointments.

Air Force Medical Reserve Is Established

General Hoyt S. Vandenberg, Chief of Staff, United States Air Force, announced today that applications are being received for commissions in the newly created Air Force Medical Reserve. Physicians, dentists, nurses, and other medical personnel who served with the Army Air Forces during the war may make application through the Air Adjutant General, United States Air Force, in Washington.

Notes of Interest

Howard H. Dukes, D.D.S., announces the reopening of his dental office for the practice of orthodontics at 754 Brotherhood Building, Kansas City, Kansas.

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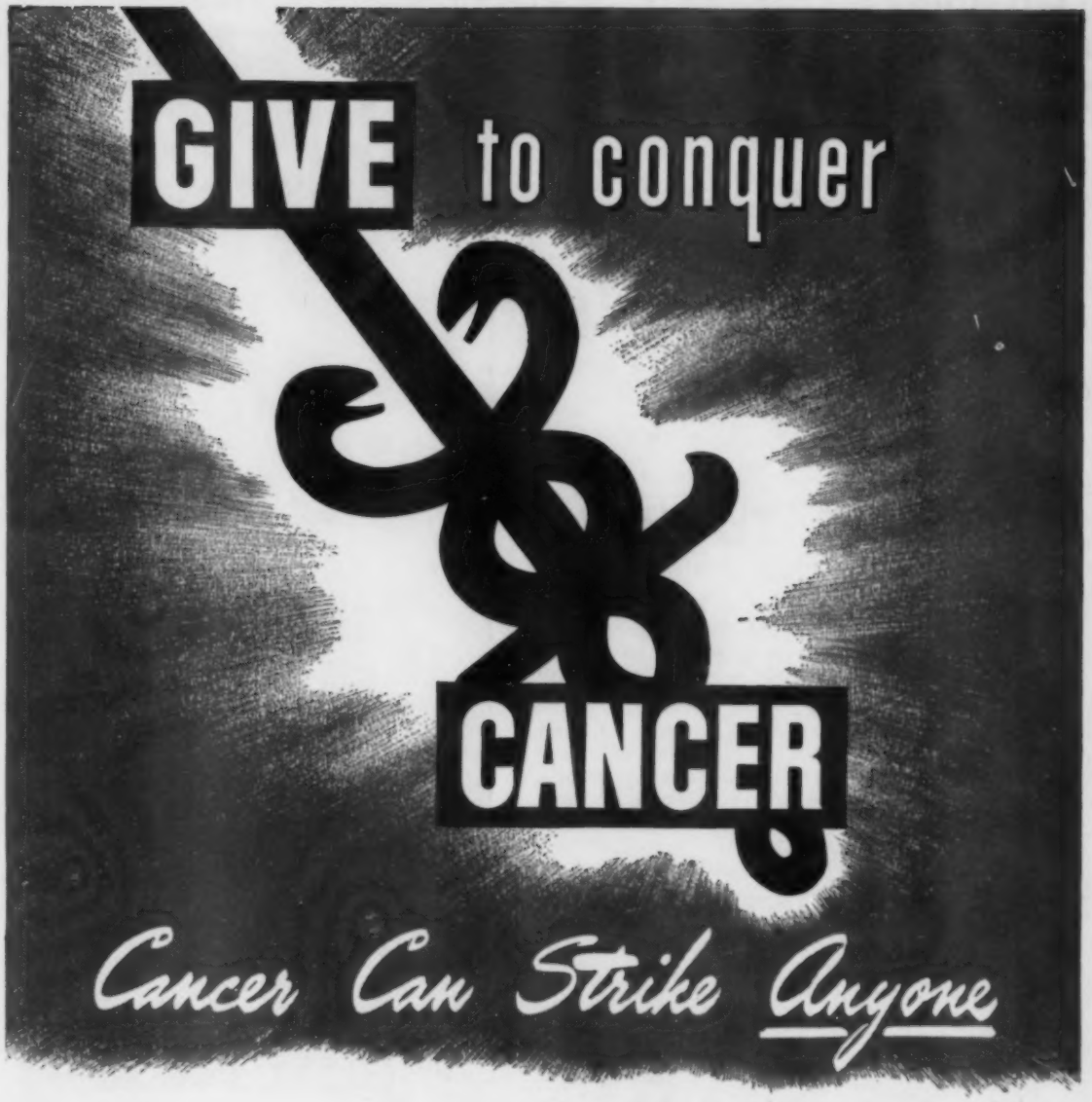

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